HEADQUARTERS
DEPARTMENT OF THE ARMY

FM 17-19D1/2

SOLDIER'S MANUAL

CAVALRY SCOUT

1 U.S.
2 War Dept
3 Field Manuals

MOS 19D

SKILL LEVEL 1/2

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Field Manual
No. 17-19D1/2

FM 17-19D1/2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC, 7 September 1979

SOLDIER'S MANUAL
MOS 19D, SKILL LEVELS 1 AND 2
CAVALRY SCOUT

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To comply with guidance of the Assistant Secretary of Defense (Manpower and Reserve Affairs), this Soldier's Manual has been reviewed for the use of neutral language. Unless otherwise noted, where the third person singular is used in this publication, the word "he" will be understood to stand for both masculine and feminine genders.

For sale by the Superintendent of Documents, US Government Printing Office
Washington, DC 20402 - Price $16.00
Stock Number 008-020-00801-0

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COMMANDER'S ATTENTION

Soldier's Manuals are designed to tell soldiers what tasks they must be proficient in to be MOS qualified. If soldiers follow the road map these manuals provide, they should progress readily to positions of responsibility commensurate with their aptitude and motivation.

Initial distribution of Soldier's Manuals will be made to the unit level, based upon assigned strength in the particular MOS and Skill Level. In the event additional manuals are needed by the unit for MOS study, libraries, or other training needs, requests for publications may be sent directly to the US Army Publications Center, 2800 Eastern Boulevard, Baltimore, MD 21220.

When soldiers are issued Soldier's Manuals by their units, they are responsible for retaining and maintaining them. If they transfer, they must return the manuals to their units.

This Soldier's Manual was prepared by the US Army Armor School, Fort Knox, Kentucky.

THOMAS P. LYNCH
Major General, USA
COMMANDANT

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RESERVE COMPONENTS: ARMY NATIONAL GUARD AND ARMY RESERVE

This Soldier's Manual contains the critical tasks to be performed by the active Army soldier in your MOS on equipment available in the active Army inventory.

Most tasks in this manual *are applicable to you* without changes. However, some tasks may require modification due to differences of equipment, facilities, and training time available.

Many tasks you learned in BCT/AIT or OSUT are in this manual. There are other critical tasks that you must learn on your own. Training references/materials are available and can be provided to you through your unit. This is where your initiative comes into play. It is to your advantage to take the initiative NOW. Your performance in your duty position will be based on your ability to perform all the critical tasks for which you are accountable.

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CHAPTER 1
INTRODUCTION

Recent battle experience has shown that long range, high velocity tank cannon and long range antiarmor missile systems will dominate future battlefields. These weapons are so lethal that:

WHAT CAN BE SEEN CAN BE HIT.

WHAT CAN BE HIT CAN BE KILLED.

To defeat the Threat, US forces must be able to find the enemy first, outmaneuver him, and outshoot him to achieve a kill ratio of five to one. The armor crewman plays a key role within the US forces.

As a scout, you serve as a member in a unit that conducts security, reconnaissance, and attack missions. To accomplish these missions, you and your unit must be well trained. This Soldier's Manual is designed to help you train. It tells you what *tasks* you are expected to perform, the *conditions* under which you are expected to perform, and the *standards* you are expected to meet in your performance. If you use this manual, you and your unit are on the way to becoming trained. Remember, only the well-trained soldier and unit are successful on the battlefield.

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DEFINITIONS

To help you more easily understand this introduction, some terms are defined on this page.

Common Task. A task performed by every soldier in the Army at a given skill level within a specified MOS.

Skill Level. A level of skill under which specific military jobs are grouped; the level of skill at which any individual qualifies in an MOS; one of five levels of MOS under EPMS.

Common Skill Level Task. A task performed by every soldier in a skill level of a specified MOS.

Critical Task. A task which is required for mission accomplishment or successful job performance and survivability on the battlefield.

Duty Position. Duty position is the same as job. It is a major subdivision of skill level. The MOS 19E may be subdivided into five skill levels. The five skill levels may be further divided into three duty positions (jobs). Each duty position consists of many tasks.

Duty Position Task. A task identified with and related to a duty position (job).

GO/NO-GO. This is a pass-fail standard of evaluation whereby the soldier (student) cannot be partially correct. He either meets the standard or he does not meet the standard.

Job. The tasks performed by a single worker constitute his job. If identical tasks are performed by several individuals, they all hold the same job. Job is the same as duty position. An MOS is comprised of skill levels. Skill levels are comprised of jobs. Thus, an MOS 19E is called an Armor Crewman but his job may be serving on an M48A5, M60A1, or M60A3.

Military Occupation Specialty (MOS). A group of closely related duty positions which are interchangeable at any skill level.

Performance Measures. Those steps the student or scorers observe to determine if the task is being performed correctly.

Task. A task is an act performed by an individual that results in either a *product* or a *result.*

Task Conditions. Conditions describe the necessary equipment *and* physical setting given the soldier to accomplish the specified task.

Task Standards. The standard specifies how well, completely, or accurately a task is to be performed.

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ENLISTED PERSONNEL MANAGEMENT SYSTEM (EPMS)

EPMS is a combination of policies pertaining to training, testing, assignments, and promotion into an overall system and is designed to improve the professionalism of the enlisted force. What does this mean to you? EPMS provides the means for you to look to the future and see a realistic and clear career path from private to sergeant major. By understanding the programs which make EPMS and by planning for professional development, you can advance through a challenging and rewarding Army career. Your progress, however, will depend on how much you use the system and how well you perform.

The following chart outlines the total Army training and promotion system under EPMS for a scout.

SKILL LEVEL	PAY GRADE	DUTY POSITION	TRAINING SCHOOL	MOS
SL 1	E1	Trainee	OSUT	19D10
	E2/E3	Driver		
	E3/E4	Scout	PNCOC	
SL 2	E5	Crew Leader Assistant Squad Leader	BNCOC	19D20
SL 3	E6	Squad Leader Section Leader	ANCOC	19D30
SL 4	E7	Platoon Sergeant Assistant Operations/ Intelligence Sergeant		19D40
SL 5	E8	First Sergeant Operations Intelligence Sergeant	SNCOC	19Z50
	E9	Staff Sergeant Major Command Sergeant Major		19Z50 00Z50

OSUT - One Station Unit Training
PNCOC - Primary Noncommissioned Officer's Course
BNCOC - Basic Noncommissioned Officer's Course
ANCOC - Advanced Noncommissioned Officer's Course
SNCOC - Senior Noncommissioned Officer's Course

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MOS

Your MOS is your Military Occupation Speciality. A code of five numbers and letters represents a group of job tasks performed in your MOS. If your MOS code is 19D10, your job is one of many related to combat arms. Your MOS was given to you when you completed your basic reconnaissance training (BRT). The number in your MOS code shows your skill level. The number and letters of your MOS code change as you progress through the five skill levels.

JOB SUMMARY

Your job is one of many related to the Armor combat arms. Your primary function is to locate Threat forces, report their position and engage them if required. You must also be proficient in the operation and maintenance of your equipment. In order to ensure a high degree of proficiency in the operation of your unit and its equipment, you must train to become skilled in all aspects of your duty position.

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SKILL LEVELS

The *skill level* (SL) tells you where you are in your MOS. It tells you:

What job you can expect to perform.
What tasks you can perform on the job.
How well you are trained.

SKILL LEVEL 1

At this skill level you are an E1, E2, E3, or E4 scout trained in OSUT and serving within a scout section of a cavalry platoon.

SKILL LEVEL 2

At this level you are a scout leader, a vehicle commander, an assistant scout squad leader.

SKILL LEVEL 3

At skill level 3 you become the principal NCO in a scout squad of an armored cavalry or comparable unit.

SKILL LEVEL 4

At this level you become the principal NCO in an armored cavalry platoon or a comparable unit.

SKILL LEVEL 5

As a 19Z50 E8, there are several duty positions you may hold: principal intelligence NCO in a headquarters of an armor cavalry squadron, armor battalion, or comparable organization below division level; principal operations NCO in a headquarters of an armor battalion, armored cavalry squadron, or comparable organization; and principal NCO in a tank company, armored cavalry troop, or comparable organization.

As a 19Z50 E9, you may be the principal intelligence NCO in the headquarters of an armored division or higher level organizations or the operations NCO in headquarters of armored cavalry regiment, armored brigade, or comparable or higher level organizations.

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DUTY POSITIONS

Your skill level also corresponds to the duty positions you may hold in your MOS. Some of those duty positions are:

SKILL LEVEL 1 (19D10)

Scout
Ammunition Handler
Scout Driver

SKILL LEVEL 2 (19D20)

Scout Observer
Crew Leader

SKILL LEVEL 3 (19D30)

Squad Leader
Section Leader

SKILL LEVEL 4 (19D40)

Platoon Sergeant

SKILL LEVEL 5 (19Z50)

Intelligence Sergeant
Operations Sergeant
First Sergeant

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PROMOTION

Your routes to promotion or Career Patterns are described in EPMS. You can follow several routes in your MOS all the way up to senior sergeant, E8 or E9. Timely promotions depend upon:

1. Having the required on-the-job experience (OJE) in your MOS or graduating from an appropriate NCOES course.
2. Having been awarded the skill level of the next higher grade by passing the SQT.

EXAMPLES:

If you are a specialist 4 skill level 1, to be promoted to sergeant (E5) you must:

1. Graduate from the Primary Noncommissioned Officer's Course (PNCOC) and/or have the required on-the-job experience (OJE).

AND

2. Pass the skill qualification test with a score that qualifies you at skill level 2.

If you are a sergeant (E5) skill level 2, to be promoted to staff sergeant (E6) you must:

1. Graduate from the Basic Noncommissioned Officers Course (BNCOC) and/or have the required on-the-job experience (OJE).

AND

2. Pass the skill qualification test with a score that qualifies you at skill level 3.

If you are a staff sergeant (E6) skill level 3, to be promoted to sergeant first class (E7) you must:

1. Graduate from the ANCOC and/or have the required on-the-job experience as a Tank Commander or Section Chief.

AND

2. Pass the skill qualification test with a score that qualifies you at skill level 4.

Figures 1 and 2 illustrate your career progression in CMF 19 beginning as a scout.

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YOUR CAREER PROGRESSION

You obtain:	You:		GRADE	GRADE LEVEL	MOS
SL5 by qualification score on SQT 5 plus OJE or NCOES (SNCOC)	maintain SL5 by qualification score on SQT 5	SL5	E9 E8	5	00Z50 19Z50
			SQT 5		
SL4 by qualification score on SQT 4 plus OJE or NCOES (ANCOC)	verify SL4 by score on SQT 5	SL4	E7	4	19D40
			SQT 4		
SL3 by qualification score on SQT 3 plus OJE	verify SL3 by score on SQT 4	SL3	E6	3	19D30
			SQT 3		
SL2 by qualification score on SQT 2 plus OJE	verify SL2 by score on SQT 3	SL2	E5	2	19D20
	verify SL1 by score on SQT 2	SL1		1	19D10
			SQT 2		
			E1-E4		

Figure 1.

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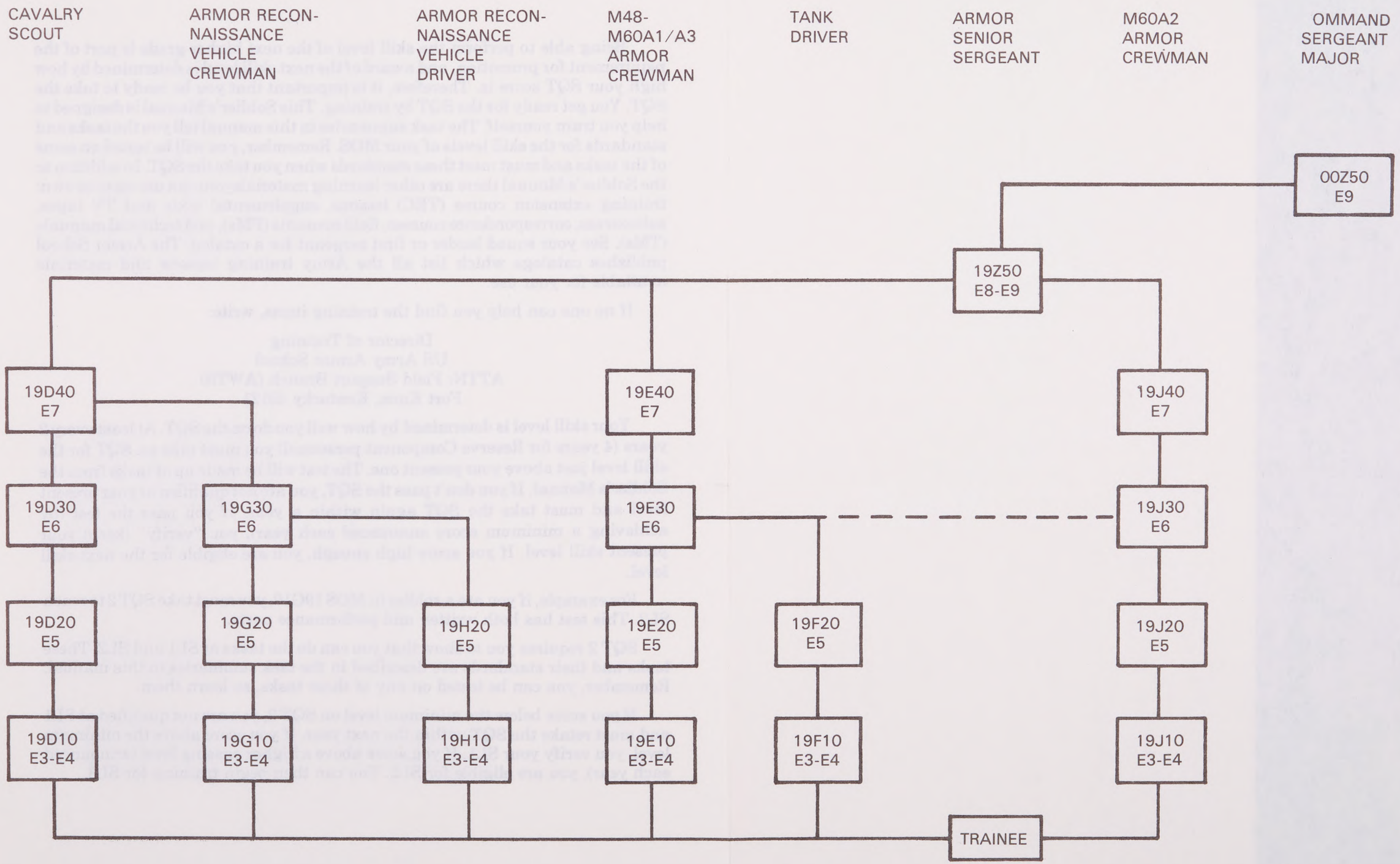
CAREER MANAGEMENT FIELD—ARMOR (19)



SUBSTITUTABILITY: At comparable skill levels between 19G and 19H, 19G and 19J, and 19E and 19F, 19J30 and 19E30, and 19J40 for 19E40.

——— Line of normal progression

Figure 2.

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HOW TO GET READY FOR THE SKILL QUALIFICATION TEST (SQT)

Being able to perform the skill level of the next higher grade is part of the requirement for promotion, and award of the next skill level is determined by how high your SQT score is. Therefore, it is important that you be ready to take the SQT. You get ready for the SQT by training. This Soldier's Manual is designed to help you train yourself. The task summaries in this manual tell you the tasks and standards for the skill levels of your MOS. Remember, you will be tested on some of the tasks and must meet these standards when you take the SQT. In addition to the Soldier's Manual there are other learning materials you can use on your own: training extension course (TEC) lessons, supplemental texts and TV tapes, subcourses, correspondence courses, field manuals (FMs), and technical manuals (TMs). See your squad leader or first sergeant for a catalog. The Armor School publishes catalogs which list all the Army training lessons and materials available for your use.

If no one can help you find the training items, write:

Director of Training
US Army Armor School
ATTN: Field Support Branch (AWTS)
Fort Knox, Kentucky 40121

Your skill level is determined by how well you do on the SQT. At least every 2 years (4 years for Reserve Component personnel) you must take an SQT for the skill level just above your present one. The test will be made up of tasks from the Soldier's Manual. If you don't pass the SQT, you are not qualified at your present level and must take the SQT again within a year. If you pass the test (by achieving a minimum score announced each year), you "verify" (keep) your present skill level. If you score high enough, you are eligible for the next skill level.

For example, if you are a soldier in MOS 19G10, you must take SQT 2 to reach SL2. This test has both written and performance parts.

SQT 2 requires you to show that you can do the tasks at SL1 and SL2. These tasks and their standards are described in the task summaries in this manual. Remember, you can be tested on any of these tasks, so learn them.

If you score below the minimum level on SQT 2, you are not qualified at SL1 and must retake the SQT within the next year. If you score above the minimum level, you verify your SL1. If you score above a higher passing level (announced each year), you are eligible for SL2. You can then begin training for SL3.

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COMPONENTS OF THE SQT

Hands-On Component (HOC)

- Included in all SQTs.
- Requires the soldier to perform actual tasks in a job-like test situation.
- Given during the test period at a time determined by the test control officer (TCO).

Performance Certification Component (PCC)

- Included in all SQTs.
- Requires the commander/supervisor to evaluate the soldier's performance of tasks on the job.
- Given any time during the test period.

Skill Component (SC)

- Uses a test booklet and answer sheet which is filled out by the soldier.
- Given during the test period at a time determined by the TCO.
- Test critical tasks which cannot be readily tested in the hands-on or performance-certification components.

Sixty to 90 days before the SQT is given, you will receive an SQT notice. It will inform you of the tasks to be tested in each part of the SQT and how the tasks will be tested. There are three different ways to test a task. First, you may be asked to answer a written question about how a task is performed (written component). You will pick the correct answer from a list of answers and mark the correct answer on a machine-scorable answer sheet. Second, you may be asked to actually do the task. For example, you may be given an M60 machinegun and be asked to prepare it for firing. This is called the hands-on component. Third, your unit commander may observe your performance of a task and report your ability to perform it (performance certification) as a part of your SQT score. Your performance on the SQT will be reported to you on an Individual Soldier's Report (ISR) within 30 days from the day you complete the last component of the SQT. The report will be sent to the test control officer for dispatch to you and your commander. An example of an ISR is on the next page.

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INDIVIDUAL SOLDIER'S REPORT (ISR)

Soldier's Score Task Failed

Soldier's SQT Report Date: 1 Jun 76
Test Number: MOS 19D SQT 2 Vers 1 yr 80 UIC: WA8AAA
Name: Jordan, James R. SSN: 415-68-9682 MOS: 19D1 TCO Number: 205

TASKS GO	TASKS NO	TASKS GO	NOT TAKEN/ EVALUATED CERT	NOT TAKEN/ EVALUATED H-O	% GO	CURRENT SKILL LEVEL VERTIFIED (MINIMUM 60%)	NEXT HIGHER SKILL LEVEL (MINIMUM 80%)
36	5		0	1	88	YES	YES

Soldier's Manual references for Task NO-GO.
S081-831-1004 H171-140-1021 H171-140-1022 C171-140-1043
C171-140-1068

C - Certification Component
H - Hands-On Component
S - Skill Component

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TRAINING

In order to be promoted under EPMS, you must maintain a high state of training. Training available to you includes:

- ***Training Center.***
  One Station Unit Training (OSUT)
  US Army Armor Center
  Fort Knox, KY
- ***Unit on-the-job training and experience*** (your Soldier's Manual).
- ***Schools.*** The school course for your MOS and Career Management Field (CMF) 19 are a part of the Noncommissioned Officer Education System (NCOES).
  - Primary NCO Course for Combat Arms (PNCOC/CA). For junior combat leaders at post/division NCO academies; require for promotion to sergeant (E5).
  - Basic NCO Course for Combat Arms (BNCOC/CA). Squad and section leader course at post/division level.
  - Advanced NCO Course (ANCOC). Cavalry and Armor Platoon Sergeant at the Armor Center.
- ***Army Correspondence Course Program.*** Operations/Intelligence Course. Senior NCO course for individuals in S2 or S3 staff section assignments.

THE SOLDIER'S MANUAL AND YOUR COMMANDER

Your commander, first sergeant, and supervisor/trainer will use this manual to schedule you for training at individual or unit level. The first sergeant and your supervisor/trainer will play a major role in your training. Any questions about your training should be directed to them. Your commander is responsible for ensuring you are properly trained. He will use the information in this manual as a basis for your training. Therefore, know this manual and be able to perform the tasks *listed* in it.

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USING YOUR SOLDIER'S MANUAL

This manual specifies the critical tasks you need to be able to perform in order to be qualified in your MOS.

COMMON TASK SKILL LEVEL 1:

The common tasks at skill level 1 are tasks you have been taught in OSUT or in your unit. These tasks are found in chapter 2.

DUTY POSITION TASKS SKILL LEVELS 1 AND 2:

The duty position tasks at skill levels 1 and 2 list those critical skills you as a 19D scout must be able to perform. Therefore, you must continuously review the duty position task list and make sure you can perform the tasks to the standards given in the task summary. These tasks are found in chapter 3.

COMMON TASKS SKILL LEVEL 2:

Additional common tasks and leadership tasks are acquired by the 19D crew leader at skill level 2. These tasks are found in chapter 2.

To make it easier for you to locate the different skill level tasks, each level has been given a distinctive color: the white pages contain the skill level 1 tasks, and the yellow pages in chapter 2 contain the skill level 2 tasks.

For each task listed in this Soldier's Manual a task summary (TS) is provided. A task summary follows this format:

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TASK

What you must do.

CONDITIONS

The conditions written for tasks in this manual tell you what you will be given to do the task.

Unless otherwise stated, all tasks are performed under normal working conditions. However, these same tasks may also be done while wearing protective gear or clothing in an area contaminated by nuclear, biological, or chemical agents. In addition, these tasks may be done during darkness or other conditions of limited visibility; in extreme cold or heat, rain, mud, snow, or sleet; and under other hardships brought about by weather, climate, or combat conditions.

Since standards tell you how well you must do the task under normal conditions, you must also prepare for hands-on performance tasks in future skill qualification tests under the conditions above.

STANDARDS

The standards, how well you do the task are based on your doing the task under normal working conditions.

PERFORMANCE MEASURES

Actions you take to complete the task.

REFERENCES

Manuals, publications, and study materials that give further information regarding the task.

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RECOMMENDED CHANGES

As a user of the Soldier's Manual, you are encouraged to recommend changes and comments to improve it. Key your comments to the specific page, paragraph, and line where the changes should be made. Give reasons for each comment so your recommended change will be understood and completely evaluated. Fill out the questionnaire card at the back of this manual and mail it. If you have detailed changes to recommend, prepare your comments on DA Form 2028 (Recommended Changes to Publications) or write them out longhand on plain paper and forward them directly to the Directorate of Training Developments, ATTN: ATSB/TD/ID, Fort Knox, Kentucky 40121.

*USAARMS is proponent for task summaries in this Soldier's Manual which begin with the numbers **171-**, and have as a middle group the numbers 121 thru 140. Preparing agencies for other tasks and their system/subject area codes (the middle number group) are:*

***031**-503*	*Chemical Directorate, US Army Ordnance Center and School (USAOC&S), Edgewood Arsenal*
***051**-191 thru 265*	*USA Engineer School (USAES)*
***061**-266 thru 310*	*USA Field Artillery School (USAFAS)*
***071**-311 thru 335*	*USA Infantry School (USAIS)*
***081**-821 thru 895*	*Academy of Health Sciences, US Army (AHSUSA)*
***113**-571 thru 715*	*USA Signal School (USASIGS)*
***121**-001 thru 040*	*USA Institute of Administration (USAIA)*
***191**-376 thru 395*	*USA Military Police School (USAMPS)*
***301**-336 thru 375*	*USA Intelligence Center and School (USAINTS)*
***551**-716 thru 790*	*USA Transportation School (USATSCH)*
###-091	*USA Air Defense School (USAADS)*
###-530	*USA Quartermaster School (USAQMS)*
###-896	*USA Combat Arms Training Board (USACATB)*

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CHAPTER 2

Section I. COMMON TASKS FOR CAVALRY SCOUTS

SKILL LEVEL 1

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MAINTAIN AN APPROPRIATE LEVEL OF PHYSICAL FITNESS

CONDITIONS

You will be tested to measure your physical fitness. If you are assigned to a combat or combat support unit, you will be given the Advanced Physical Fitness Test. If you are assigned to a combat service support unit or a TDA organization, you will be given the Staff and Specialist Physical Fitness Test. This test will be in daylight at a site established for the physical fitness test appropriate to your unit.

STANDARDS

You must demonstrate, once every 6 months, that you can meet or exceed the minimum level of physical fitness required of each member of your unit in accordance with the standards contained in AR 600-9 by:

1. Exceeding the minimum standard score of 60 points on each test event with a total score of 300 or more points on the Advanced Physical Fitness Test if you are under the age of 40 and are assigned to a combat or combat support unit.

2. Exceeding the minimum standard total score of 300 or more points on the Staff and Specialist Physical Fitness Test if you are under the age of 40 and are assigned to a combat service support or TDA unit.

PERFORMANCE MEASURES

1. Complete the five events of the Advanced Physical Fitness Test (APFT) listed below, as outlined in FM 21-20.

   a. Inverted crawl.

   b. Run, dodge, and jump.

   c. Horizontal ladder.

   d. Bent-leg situps.

   e. Two-mile run.

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PERFORMANCE MEASURES (cont)

2. Personnel over the age of 40 may elect not to take the APFT. If they elect to take it, they must complete the test once they have begun the first event or else they will receive a NO GO for the entire test.

3. Complete the five events of the Staff and Specialist Physical Fitness Test listed below, as outlined in FM 21-20.

   a. Pushups.

   b. Run, dodge, and jump.

   c. Horizontal ladder.

   d. Bent-leg situps.

   e. One-mile run.

SQT REQUIREMENTS

1. Failure to meet the standards for either test will result in an evaluation of NO GO. Personnel with profiles, who cannot complete all five events of either test, will be scored as "nonobserved" on the performance certification portion of the SQT.

2. SQT credit will be awarded as follows:

EVALUATION	SQT POINTS
NO GO	0
GO	1
"NONOBSERVED"	Does not count for or against total SQT score.

REFERENCES

AR 600-9, Army Physical Fitness Program and Weight Control Program, chap 2, pp 2-1 thru 2-2, para 2-1 thru 2-6.
FM 21-20 w/C 3, Physical Readiness Training, chap 24 thru 26, pp 211 thru 253, para 386 thru 424.

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PERFORM CARDIOPULMONARY RESUSCITATION (CPR) USING THE ONE-MAN METHOD

CONDITIONS

Given a soldier who is apparently not breathing and apparently has no pulse.

STANDARDS

Perform cardiopulmonary resuscitation (CPR) in accordance with the performance measures. Continue until the soldier is breathing on his own, or until relieved by a medic.

PERFORMANCE MEASURES

1. Check for breathing, pulse, and consciousness.
2. Shake the soldier's shoulder and shout, "Are you OK?" If the soldier answers, resuscitation is not needed.
3. If the soldier does not answer, call for help.
4. Roll the soldier on his back.
5. Kneel near the soldier's shoulders.
6. Tilt the soldier's forehead back and lift his neck (fig 1).
7. Pinch the soldier's nose closed (fig 1).
8. Check for breathing, by placing your ear near his mouth while looking at his chest. You can then see if the chest rises and falls, and feel or hear his breathing. If the soldier is breathing, mouth-to-mouth resuscitation is not necessary.

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PERFORMANCE MEASURES (cont)

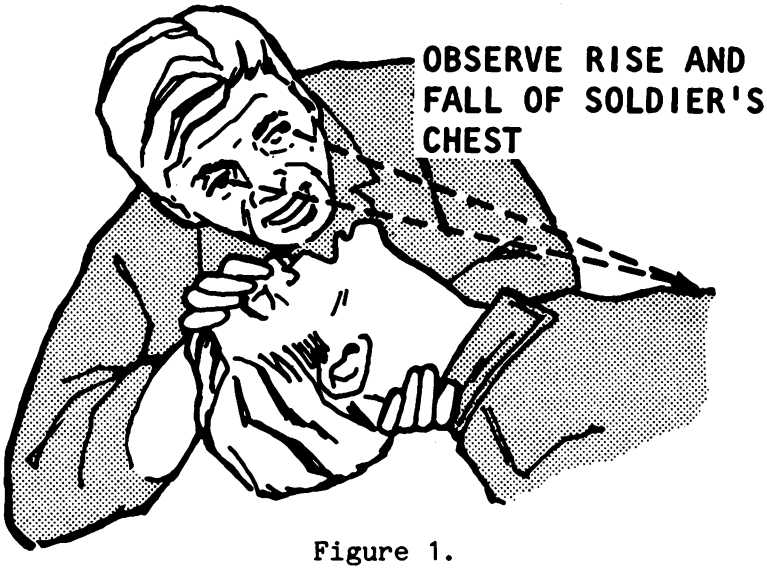

Figure 1.

9. If the soldier is not breathing, place your mouth completely over the soldier's mouth to make an air-tight seal while continuing to hold his nose closed.

10. Blow four quick breaths into his mouth, not allowing the soldier to completely exhale between breaths.

    CAUTION: If the soldier's chest does not rise or your feel strong resistance to your first breath, the soldier's airway may be clogged. You should then do the following:

    a. First, raise the soldier's neck more and again try four forceful, quick breaths.

    b. If his airway still seems clogged, look in his mouth and take out any false teeth, foreign matter, or pull out his tongue (if he swallowed it). Again try four forceful, quick breaths.

    c. If his airway still seems clogged, do the Heimlich maneuver (see Task Summary 081-831-1003). The clog must be cleared before proceeding to the next step.

11. After the fourth breath, release his nose.

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PERFORMANCE MEASURES (cont)

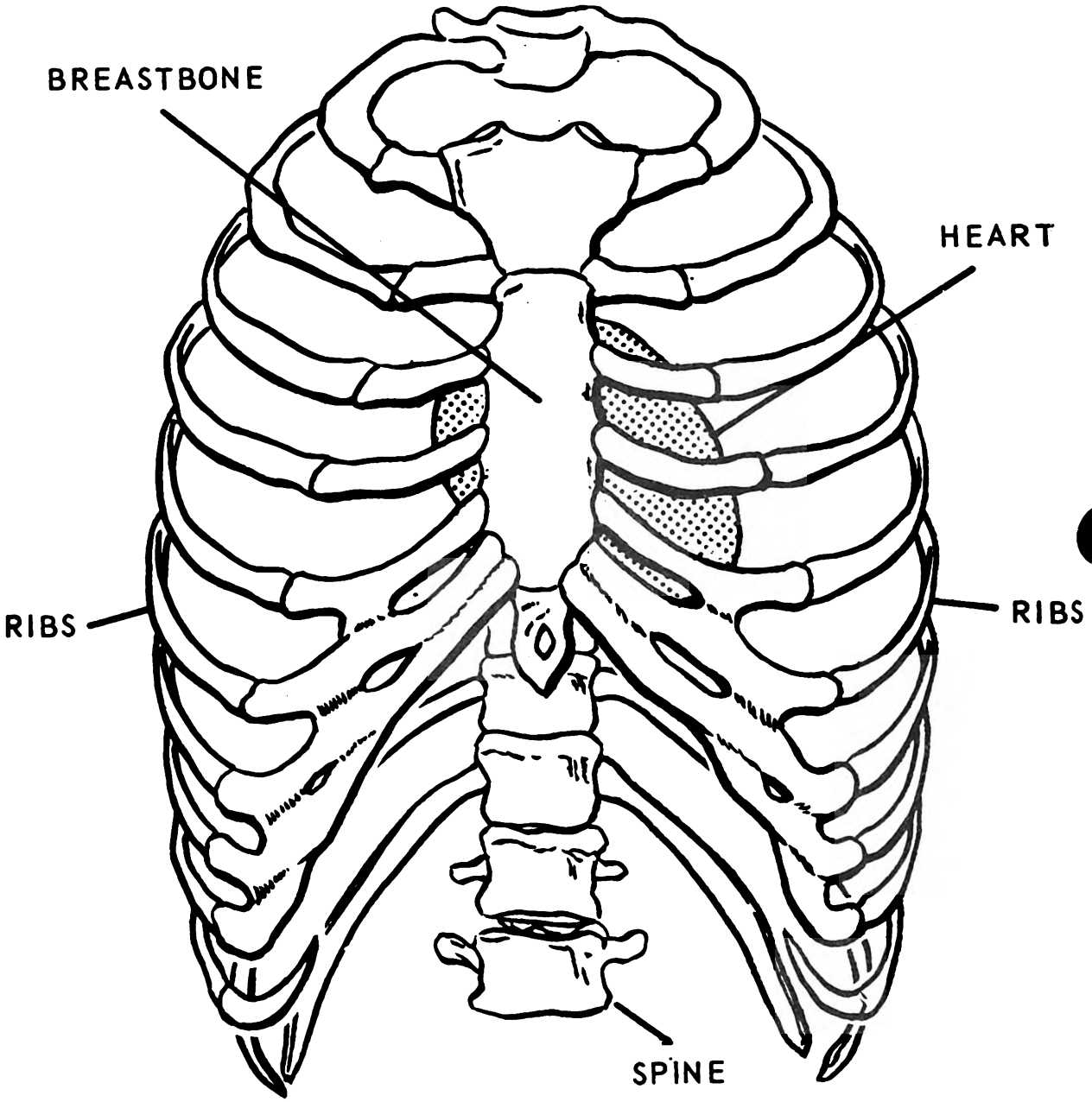

Figure 3.

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PERFORMANCE MEASURES (cont)

15. Place your hands over the bottom of the breastbone (fig 4).

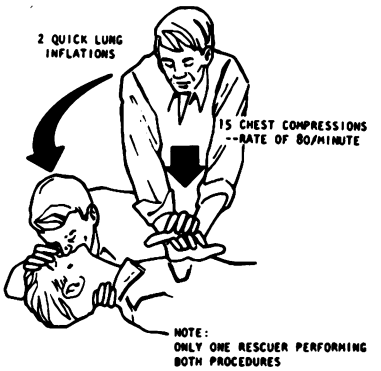

Figure 4.

16. Place your shoulders directly over the soldier's breastbone. Keep your arms straight with your fingers raised off his chest, and push straight down (fig 4).

    Note. Apply only enough pressure to push the breastbone down 1-1/2 to 2 inches. When lifting back up, do not lift your hands off of his chest. Do not bounce or rock.

17. Press down on the chest 80 times per minute. Chest presses should be done in groups of 15 to the count of "ONE AND TWO AND THREE AND FOUR AND FIVE. . . AND FIFTEEN."

18. After every 15 chest presses, blow two full breaths into the soldier's mouth (fig 4). Allow the soldier's chest to fall after each breath.

19. Go back to doing chest presses exactly as before (see performance measures 15 through 18). After each group of 15 chest presses, blow two full breaths into the soldier's mount.

20. After doing four groups of 15 chest presses and two breaths, check the soldier's pulse. Take no longer than 5 seconds to do so.

    Note. If a pulse is felt, stop the CPR for no longer than 5 seconds to be sure that the pulse is due to the soldier's heart beating and not from the chest presses. If the pulse stops, continue with CPR.

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PERFORMANCE MEASURES (cont)

21. Continue chest presses and applying breaths until:

    a. The soldier breathes on his own.

    b. You are relieved by medically trained personnel.

    c. You are exhausted and/or can no longer function.

    Note. If the soldier has a pulse but is not breathing, then continue mouth-to-mouth resuscitation.

REFERENCES

None

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CLEAR AN AIRWAY USING THE HEIMLICH MANEUVER

CONDITIONS

Given a soldier who is choking or has a clogged airway.

STANDARDS

Airway is cleared.

PERFORMANCE MEASURES

1. When the soldier is sitting or standing:

   a. Stand behind the soldier.

   b. Wrap your arms around the soldier's waist under his arms (fig 1).

Figure 1.

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PERFORMANCE MEASURES (cont)

c. Make a fist with one hand and put it on the soldier's stomach just below the ribs and above the navel.

d. Grab your fist with your other hand.

e. Press your fist into the soldier's stomach, with a forceful, fast, upward thrust. Allow the soldier time to inhale in order to get air in the lungs; repeat if necessary.

f. Do performance measure 1e until the soldier stops choking.

Note. If the soldier vomits, turn his head to the side and wipe his mouth out so he will not choke on his vomit.

2. When the soldier is lying on his back:

a. Kneel over (straddle) his hips, facing his head (fig 2).

Figure 2.

b. Make a fist with one hand and put it on the soldier's stomach just below the ribs and above the navel (fig 2).

c. Put your other hand on your fist.

d. Push your fist into the soldier's stomach, with a fast, upward thrust.

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PERFORMANCE MEASURES (cont)

e. Allow the soldier time to inhale in order to get air in the lungs; then repeat step d if needed.

3. When the soldier is on his side or stomach, roll him onto his back and follow steps in 2.

REFERENCES

FM 21-11, First Aid for Soldiers, para 9-14.

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APPLY FIRST-AID MEASURES TO STOP BLEEDING

CONDITIONS

Given a soldier with a bleeding wound.

STANDARDS

Stop or control the bleeding in accordance with the performance measures.

PERFORMANCE MEASURES

1. Stop bleeding using pressure.

    a. Make sure the soldier is breathing.

        Note. If he is not breathing or does not have a heartbeat, open the airway and restore breathing and heartbeat as explained in Task Summary 081-831-1002, Perform Cardiopulmonary Resuscitation.

    b. Apply a first aid dressing according to the instructions on the dressing package (see fig 1).

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PERFORMANCE MEASURES (cont)

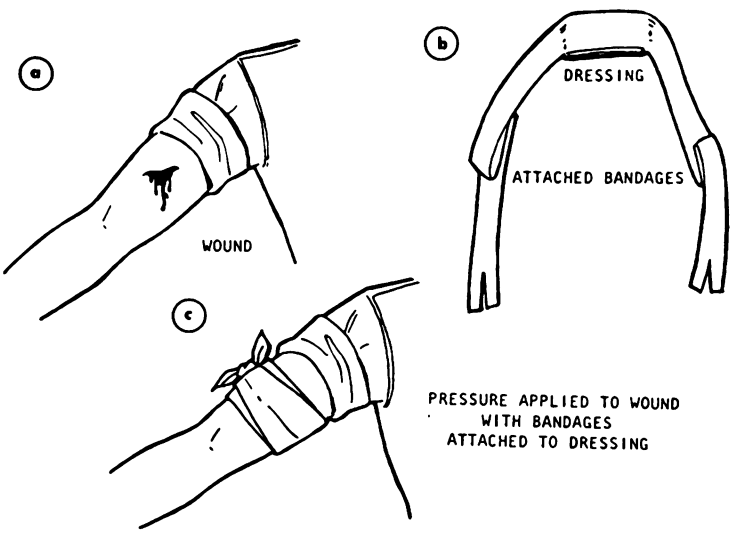

Figure 1. Application of first-aid dressing.

Notes. 1. Raising the injured limb above the level of the heart will help to control the bleeding. Use the soldier's helmet, pack, or other object to keep the injured limb elevated.

2. You may need to press hard on the first aid dressing with your hand to help control the bleeding. You may have to press for 5 to 10 minutes to allow a clot to form (fig 2).

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PERFORMANCE MEASURES (cont)

Figure 2.

c. If the bleeding does not stop:

(1) Put additional pressure on the wound by placing a thick wad of padding (socks, handkerchief, etc.) on top of the first aid dressing at the location of the wound (fig 3).

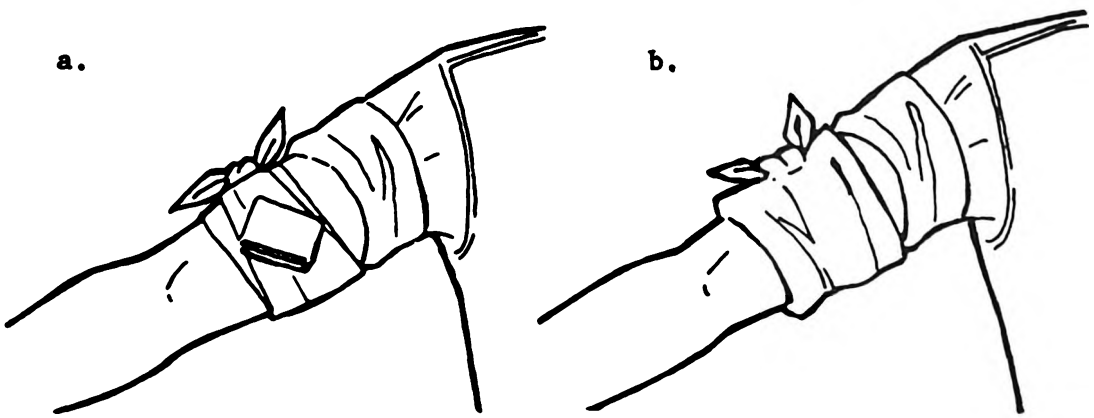

Figure 3.

(2) Tie this wad firmly in place using a strip of cloth or other material.

Note. Continue to use hand pressure and elevation.

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PERFORMANCE MEASURES (cont)

Note. The use of pressure as described in step (1) above will control the bleeding from most wounds.

2. Stop bleeding using a tourniquet.

CAUTION: A tourniquet is the most extreme method of stopping bleeding. The use of a tourniquet can cause severe damage to blood vessels and nerves and can even cause the loss of an arm or leg. The only times you should ever apply a tourniquet are when an arm or leg has been cut off or when there is very heavy bleeding which cannot be stopped by the pressure methods described above.

a. Place the tourniquet. The tourniquet must be applied between the wound and the heart. The object is to stop bleeding and save as much of the arm or leg as possible.

(1) If an arm or leg has been cut off below the elbow or below the knee, place the tourniquet above the elbow joint or knee joint to get good bleeding control and to keep the tourniquet from slipping off.

(2) If the arm or leg has been cut off above the elbow or the knee, place the tourniquet as close as you can to the wound and still be able to get a firm hold on the arm or leg so that the tourniquet will not slip off.

CAUTION: If only part of a hand or foot has been cut off, you should stop the bleeding using the pressure methods.

(3) If a wound is bleeding very heavily and you have not been able to stop the bleeding using the pressure methods, place the tourniquet as close as you can to the edge of the wound.

b. Tighten the tourniquet.

(1) Tie the tourniquet, using a square knot (fig 4).

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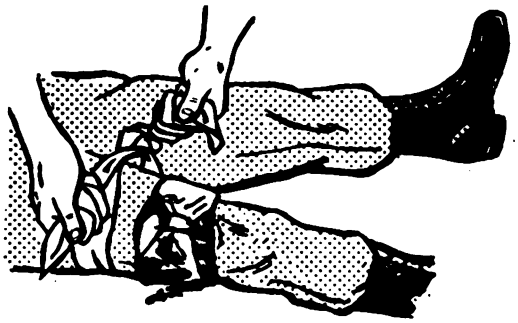
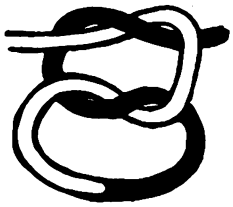
PERFORMANCE MEASURES (cont)



MAKE A LOOP AROUND THE LIMB; TIE WITH SQUARE KNOT.



SQUARE KNOT

Figure 4.

(2) Place a rigid object, such as a stick, between the wound and the tourniquet (fig 5).

PASS A STICK, SCABBARD, OR BAYONET UNDER THE LOOP.

Figure 5.

(3) Twist the stick to tighten the tourniquet just enough to stop the bleeding (fig 6).

TIGHTEN TOURNIQUET JUST ENOUGH TO STOP ARTERIAL BLEEDING.

Figure 6.

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PERFORMANCE MEASURES (cont)

c. Check the soldier's pulse at the wrist or ankle of the injured arm or leg. If you cannot feel the pulse, the tourniquet is tight enough.

d. Tie the tourniquet to the injured arm or leg (fig 7).

Figure 7.

CAUTION: The tourniquet must be tied to keep it from slipping or unwinding.

e. Mark on the soldier's forehead, if possible, a "T" and the time the tourniquet was applied.

f. Get the soldier to medical help as soon as possible.

g. Keep the soldier from chilling or overheating, depending on the weather. If you must cover him, leave the tourniquet uncovered so it can be easily seen.

CAUTION: DO NOT LOOSEN THE TOURNIQUET AFTER IT HAS BEEN APPLIED.

REFERENCES

FM 21-11, First Aid for Soldiers, chap 4, pp 29 thru 35.

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GIVE FIRST AID TO PREVENT SHOCK

CONDITIONS

Given an injured soldier who may be showing signs of shock.

STANDARDS

Give first aid to prevent shock in accordance with the performance measures.

Note. Shock as the result of an injury is usually caused by loss of blood. If a soldier appears to have a minor injury but is in shock, he either lost a lot of blood before you saw him or he has internal bleeding from another injury.

PERFORMANCE MEASURES

1. Identify signs of shock.

   a. The soldier who is in the early stages of shock may be:

      (1) Restless.

      (2) Thirsty.

      (3) Sweaty, but have cool skin.

      (4) Pale.

      (5) Showing signs of a rapid pulse.

   b. Soldiers in a more severe stage of shock may:

      (1) Have a rapid pulse.

      (2) Have lost a large amount of blood.

      (3) Be breathing with short, fast breaths or gasps.

      (4) Have bluish skin, especially around the mouth.

      (5) Be unconscious with deep slow breathing.

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PERFORMANCE MEASURES (cont)

2. Make sure the soldier can breathe and has a heartbeat (pulse). You may have to:

   a. Clear the soldier's airway (see Task Summaries 081-831-1002 and 081-831-1003).

   b. Lay the soldier with his head turned to the side to drain any fluid in his airway.

   c. Give the soldier cardiopulmonary resuscitation (CPR) (see Task Summary 081-831-1002).

3. Stop the bleeding (see Task Summary 081-831-1004).

4. Lay the soldier on his back with feet raised 12 inches higher than his head.

5. Splint fractures (see Task Summary 081-831-1006).

6. Prevent chilling or overheating, depending on the weather.

7. Keep the injured soldier calm by:

   a. Being calm yourself.

   b. Being gentle, yet firm in your actions.

   c. Not giving him any information about his injury.

8. Give the soldier water unless he has a stomach, neck, or head wound.

REFERENCES

FM 21-11, First Aid for Soldiers, para 5-1 thru 5-8, pp 36 thru 39.

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SPLINT A SUSPECTED FRACTURE

CONDITIONS

Given a soldier who has a suspected fracture. Required equipment: Any material available for making a splint (poles, sticks, tree limbs, boards, etc.), padding material (socks, clothing, etc.), bandages (belts, strips of cloth, etc.).

STANDARDS

Splint the suspected fracture without cutting off blood circulation so that the joints above and below the fracture cannot be moved.

PERFORMANCE MEASURES

1. Check for other injuries and do any necessary life-saving measures.

   Notes. 1. Try not to move soldier, unless absolutely necessary, until the suspected fracture has been splinted.

   2. Cover any wound with a sterile dressing or clean handkerchief.

2. Loosen clothes, but do not move the fractured part.

3. Get splints, padding, and bandages. Make sure the splints are long enough to immobilize the joints above and below the suspected fracture.

   a. When no materials are available to splint a fractured leg, the victim's uninjured leg may be used as a splint by securing it to the fractured leg, in accordance with the performance measures.

   b. When the victim has a suspected fracture of the ankle, the boot acts as a splint and should not be removed.

4. Pad the splints. This is very important when the splint will touch bony areas (elbow, wrist, knee, or ankle), the crotch area, or an armpit. If padding material is not available, splint without padding.

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PERFORMANCE MEASURES (cont)

5. Put on the splint with the fractured arm or leg in as normal a position as possible (figs 1 and 2).

   Note. If the suspected fracture is at or near a joint, or the bone is in an unnatural position, do not move the joint or straighten the bone. Splint in the position found.

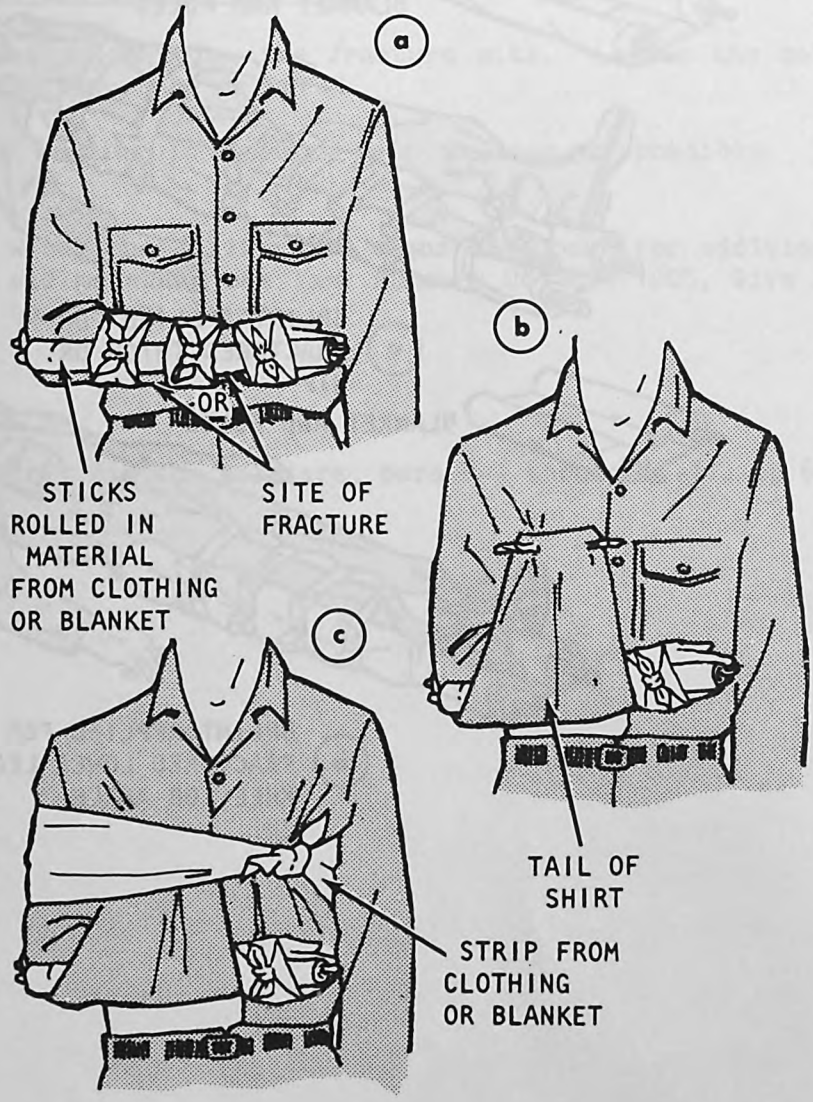

Figure 1. Fractured forearm or wrist splinted with sticks and supported with tail of shirt and strips of material.

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PERFORMANCE MEASURES (cont)

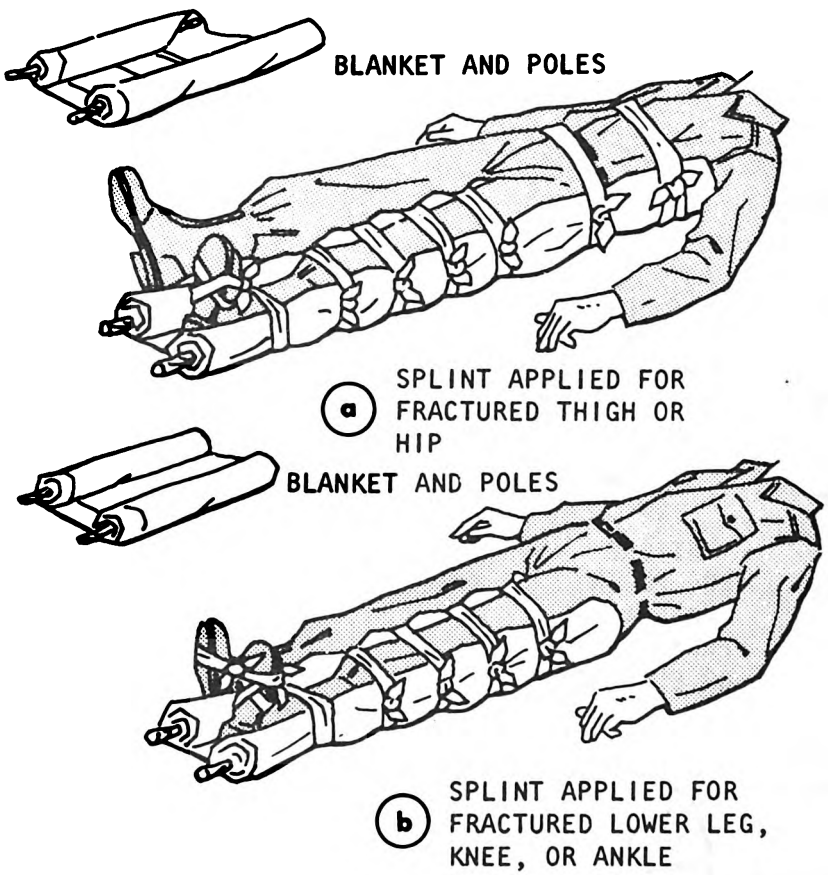
BLANKET AND POLES
a
SPLINT APPLIED FOR FRACTURED THIGH OR HIP
BLANKET AND POLES
b
SPLINT APPLIED FOR FRACTURED LOWER LEG, KNEE, OR ANKLE

Figure 2. Application of splints to lower extremity fractures, using poles rolled in a blanket.

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PERFORMANCE MEASURES (cont)

6. Tie the splint securely in place with strips of cloth.

   a. Tie the splint above and below the suspected fracture as shown in figures 1 and 2. Do not tie a cloth directly over the fracture.

   b. Tie all bandages so the knot is against the splint. Do not tie the splints too tight.

7. Check the pulse below the fracture site. Loosen the bandages if the pulse cannot be detected.

8. Get the soldier to medical help as soon as possible. Keep him warm.

   Note. Watch the soldier for signs of shock (for additional first aid measures see Task Summary 081-831-1005, Give First Aid to Prevent Shock).

REFERENCES

FM 21-11, First Aid for Soldiers, para 8-1 through 8-11, pp 64-83.

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GIVE FIRST AID FOR BURNS

CONDITIONS

Given a soldier with burn(s) and individual first aid case.

STANDARDS

Give first aid as described in the performance measures.

Note. Many things cause burns: fire, explosions, chemicals, the sun, electricity, lasers, etc. First aid is the same for all, except that chemical burns need extra treatment.

PERFORMANCE MEASURES

1. Cover the burn with a sterile dressing from the soldier's first aid case (clean cloth may be used if dressing is not available.)

   CAUTION: Before covering burns

   1. Do not pull off pieces of cloth which are stuck to the burn.
   2. Do not attempt to clean the burn area in any way.
   3. Do not pull clothing over the burned area.
   4. Do not break blisters.
   5. Do not apply ointments or medications.

   Note. If burn was caused by a chemical, pour large amounts of water over the burned area before covering.

2. The soldier may have water unless he is:

   a. Unconscious.

   b. Vomiting or nauseated.

   c. Wounded in the stomach or neck.

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PERFORMANCE MEASURES (cont)

3. Give first aid to prevent shock (see Task Summary 081-831-1005).

4. Move (evacuate) soldier to medical help as soon as possible.

REFERENCES

None.

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GIVE FIRST AID TO A NERVE-AGENT CASUALTY

CONDITIONS

Given a contaminated environment and a masked soldier who may have been exposed to a nerve agent; two nerve agent antidote injectors (combo pen), M13 decontamination kit, and an M258 decontamination kit. You are wearing protective clothing.

STANDARDS

Give nerve-agent antidote and decontaminate the soldier, his clothing and his equipment in accordance with the sequence of performance measures.

PERFORMANCE MEASURES

Note. Upon exposure to nerve agents, each individual soldier should be able to take protective action and administer self-aid, if necessary. If he is not able to do this for himself, it will have to be done by another soldier.

1. Recognize nerve-agent symptoms. These symptoms will appear in an individual who was well before and gets worse within a very few minutes. Symptoms of nerve agent are:

   a. Difficulty in breathing with tightness in chest.

   b. Pinpointing of eye pupils.

   c. Excessive running nose.

   d. Excessive saliva and drooling.

   e. Jerking and twitching muscles, staggering.

   f. Headache, dizziness.

   g. Nausea, cramps.

2. Give nerve-agent antidote.

   a. Remove two combo pens from soldier's mask carrier.

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PERFORMANCE MEASURES (cont)

b. Remove safety cap from one combo pen. Place needle end against injured soldier's outer thigh, press hand and hold for 10 seconds. (fig 1).

c. Remove the safety cap from the second combo pen. Place needle end against injured soldier's outer thigh, a couple of inches from the first injection, press hard and hold for 10 seconds.

d. Rub his thigh for 10 to 15 seconds.

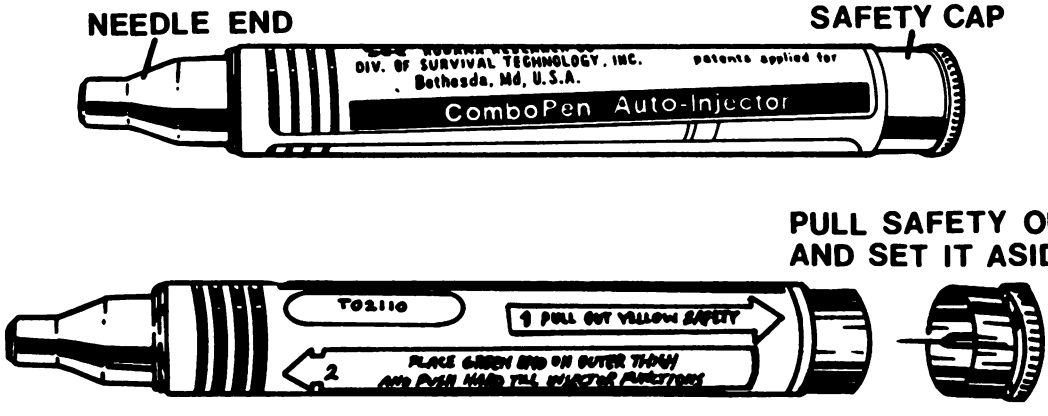
e. Stick the injector needles through the injured soldier's shirt collar or pocket and bend the needle to secure the pen to clothing.

3. If injured soldier stops breathing, give artificial respiration (see Task Summary 081-831-1014 or 081-831-1015).

4. Decontaminate the injured soldier, his clothing, and his equipment (see Task Summaries 031-503-1007, Decontaminate Self; and 031-503-1008, Decontaminate Individual Equipment).

ANTIDOTE, NERVE AGENT AUTO-INJECTOR

1. PULL OUT SAFETY CAP.



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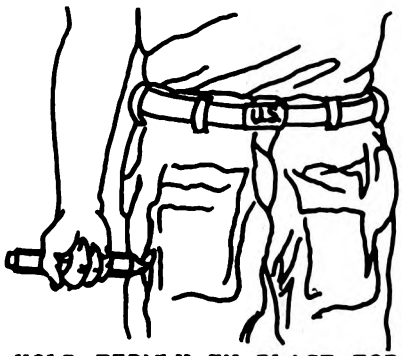
PERFORMANCE MEASURES (cont)

2. PLACE BLACK END ON OUTER THIGH AND PUSH HARD TILL INJECTOR FUNCTIONS.



Hold device by labelled part and push black end against thigh.

Device will "click" when activated.

3. HOLD FIRMLY IN PLACE FOR TEN SECONDS.

After device activates, hold in place for 10 seconds (3 - 4 breaths) to allow the drug to enter the body.

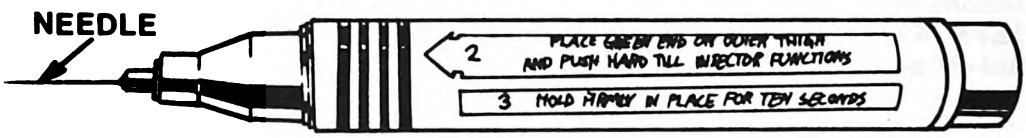


Figure 1.

4. After giving injections, seek medical help for the injured soldier. Do NOT give more than two combo pens.

REFERENCES

FM 21-41, Individual NBC Defense: pp 12 thru 15, 32, and 33.
FM 21-11, First Aid for Soldiers, para 11-6, p 127.

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GIVE FIRST AID TO A BLISTER-AGENT CASUALTY

CONDITIONS

In a contaminated chemical environment, given a soldier injured by a blister-agent, an M258 decontaminating kit or an M13 decontaminating kit, and a sterile dressing.

STANDARDS

Give first aid to a soldier injured by a blister-agent as described in the performance measures.

PERFORMANCE MEASURES

Note. Upon exposure to blister agents, each individual soldier should be able to take protective action and administer self-aid, if necessary. If he is not able to do this for himself, it will have to be done by another soldier.

1. Recognize presence of blister agent.

    a. Mustard.

        (1) An oily liquid.

        (2) Colorless to dark brown.

        (3) Causes little or no pain at the time of contact.

    b. Pure lewisite.

        (1) A colorless liquid.

        (2) Causes instant pain on contact.

    c. If blister agent is on the skin a long time:

        (1) A larger area of skin is affected.

        (2) The skin becomes inflamed (red).

        (3) Blisters begin to appear.

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PERFORMANCE MEASURES (cont)

2. Take individual protection:

   a. Put on your protective mask and secure protective hood over head and shoulders.

   b. Put on your protective clothing and wear protective gloves.

3. Mask the injured soldier, if he is not already masked.

4. Flush the injured soldier's eyes if it appears the agent is in his eyes.

   a. Remove injured soldier's canteen and unscrew the cap.

   b. Remove injured soldier's helmet.

   c. Tell the injured soldier to take a deep breath and hold it while you raise his mask.

   d. Tilt his head back and to the right, and flush the right eye with water from the canteen. Pour the water slowly into the eye so the water does not run onto face or clothing.

   e. Tilt his head back and to the left to flush the left eye.

      Note. If the casualty can not keep his eye open, have him pull his eyelid away from his eye. Make sure his fingers are not contaminated. Use approximately one-third of the canteen water on each eye.

   f. Have injured soldier reseat and clear his mask before starting to breathe again.

4. Decontaminate the exposed skin of the injured soldier, his clothing and his equipment (see Task Summaries 031-503-1007 and 031-503-1008).

5. If blisters form, cover them with a loose sterile dressing from the injured soldier's first aid packet and secure the dressing with the attached bandagges. Do not break blisters.

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TASK SUMMARY 081-831-1012 (cont)

PERFORMANCE MEASURES (cont)

6. Seek medical attention if blisters develop.

REFERENCES

FM 21-11, First Aid for Soldiers, para 11-9, p 134.
FM 21-41, Individual NBC Defense: pp 14 thru 15.

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GIVE FIRST AID TO A BLOOD-AGENT CASUALTY

CONDITIONS

In an area where a blood agent is present, given a soldier injured by a blood agent. You are wearing your protective mask and clothing. Required equipment: amyl nitrite ampuls.

STANDARDS

Give the antidote (amyl nitrite ampuls) as described in the Performance Measures.

PERFORMANCE MEASURES

Note. Upon exposure to blood agents, each individual soldier should be able to take protective action and administer self-aid, if necessary. If he is not able to do this for himself, it will have to be done by another soldier.

1. Put a mask on the soldier so that it is sealed.

2. Check the soldier for symptoms of blood-agent poisoning. Symptoms appear quickly after exposure to blood agents and include:

   a. Dizziness.

   b. Headache.

   c. Irritated eyes and nose.

   d. Pink skin.

   e. Red or purple color under the fingernails.

3. Give the antidote.

   a. Take the soldier's box of amyl nitrite ampuls out of his mask carrier (fig 1).

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PERFORMANCE MEASURES (cont)

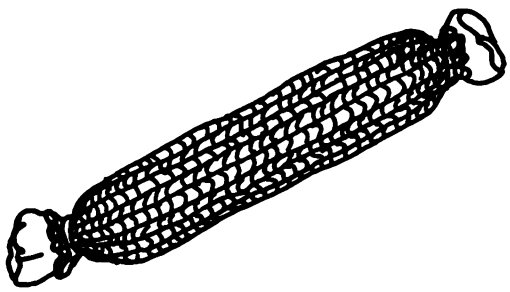

Figure 1.

b. Open the seal of the soldier's mask at the temple strap.

c. Crush 2 ampuls and quickly put them in the mask at the eyelens area.

Note. Do performance measures 3b and 3c at 4-5 minute intervals until the soldier begins breathing normally or until a total of 8 ampuls are given.

CAUTION: If the soldier is not breathing or if breathing is weak, give artificial respiration. While giving the antidote, use the back-pressure armlift method (see Task Summary 081-831-1015, Perform Artificial Resuscitation for a Chemical-Agent Casualty Using Back-Pressure Armlift Method). If you are still in the presence of a blood agent, give mask-to-mouth resuscitation (see Task Summary 081-831-1014, Apply Mask-to-Mouth Resuscitation to a Chemical-Agent Casualty).

4. Get the soldier to medical help.

REFERENCES

FM 21-11, First Aid for Soldiers, p 135, para 11-11.
FM 21-41, Individual NBC Defense: pp 16, 35.

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APPLY MASK-TO-MOUTH RESUSCITATION TO A CHEMICAL-AGENT CASUALTY

CONDITIONS

Given a soldier who is not breathing, is unconscious, but still has a pulse (heartbeat). The soldier has been exposed to a chemical agent and is in a contaminated area. Both you and the injured soldier are wearing protective masks and you have an M1 resuscitation tube.

STANDARDS

Complete the steps in the performance measures, performing mask-to-mouth resuscitation without error.

PERFORMANCE MEASURES

1. Prepare your mask (fig 1):

   a. Turn the valve handle at the voicemitter to the left position.

   b. Place and hold the breathing tube bite-piece between your teeth.

      Note. The bite-piece will spring back to the neutral position if you release your bite.

   c. Lift up the voicemitter cover and insert the air outlet valve of the M1 resuscitation tube into the air outlet well under the voicemitter cover.

      Note. To get a tight, leakproof seal, first insert the unflanged edge of the air outlet valve with an upward push, and then press the flanged edge inward, toward you.

   d. Check for a leakproof seal. Fold back and pinch the lower end (mouthpiece) of the M1 resuscitation tube. Now blow into your breathing tube bite-piece.

      Note. If you have a leakproof seal, the M1 resuscitation tube will expand. If it does not, remove the air outlet valve from your mask and start all over. You must have a leakproof seal or you will blow contaminated air into the soldier's lungs.

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PERFORMANCE MEASURES (cont)

2. Place the soldier on his back, raising his shoulders with a poncho, blanket or something similar (fig 2).

3. Kneel at the soldier's head on a blanket or other material so you will not contact the contaminated surface (fig 2).

4. Take off the soldier's mask and place it on his chest.

5. Take any false teeth, dirt, or other material out of the soldier's mouth.

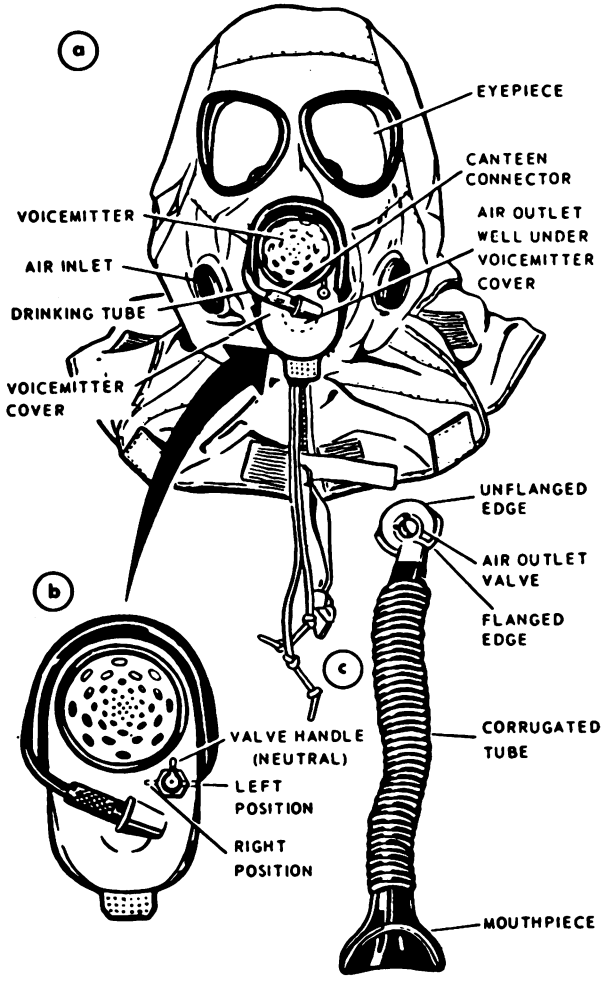

Figure 1. M17A1 field protective mask and M1 resuscitation tube.

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PERFORMANCE MEASURES (cont)

6. Tilt the soldier's head backward in a chin-up position.

7. Insert the resuscitation tube:

   a. Insert the mouthpiece with the indented portion under the soldier's upper lip between his lips and teeth.

      Note. Make sure the edges of the mouthpiece are completely covered by his lips.

   b. Seal the mouthpiece in place by placing your thumb and index finger over the soldier's lips (fig 3). Hook the other three fingers under his chin to keep his jaw up.

8. Pinch the soldier's nose closed with your free hand.

9. Blow four quick, forceful breaths into the soldier's mouth and see if his chest rises.

   Note. If his chest does not rise, hold his chin up higher and blow harder. Make sure the edges of the mouthpiece are completely covered by the soldier's lips.

10. Check for the soldier's pulse (see Task Summary 081-831-1002, Perform Cardiopulmonary Resuscitation (CPR) Using the One-Man Method, fig 2).

11. If there is a pulse, continue breathing into the resuscitation tube once every 5 seconds. After each breath, release his nose, then close it again as soon as the soldier breathes out.

    Note. If the soldier's breath is noisy, hold his chin up higher or clear the airway again.

12. When the soldier begins to breathe on his own, adjust your breathing to assist him by blowing into the resuscitation tube when he is breathing in, not when he is breathing out.

13. When the soldier begins to breathe regularly, stop blowing, but leave the tube in place. Continue to close his nose when he inhales and open it when he exhales.

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PERFORMANCE MEASURES (cont)

Note. Begin resuscitation if the soldier does not continue to breathe regularly. Continue resuscitation as long as there is a pulse, or until the soldier begins to breathe on his own, or until you are relieved by medically trained personnel, or until too exhausted to continue.

14. When the soldier can breathe without help, take the tube from his mouth and quickly put on his mask. If he is conscious, have him clear his mask and be sure it fits properly.

15. Watch the soldier to be sure he does not stop breathing again as the result of a chemical agent that may have built up in his mask.

16. Adjust your mask.

    a. Release the breathing tube bite-piece, allowing it to spring back to its neutral position.

    b. Disconnect the tube from your mask. Pull the tube out and up, and replace the voicemitter cover.

    c. Wipe the tube mouthpiece clean and stow it in the carrier.

REFERENCES

FM 21-11, First Aid for Soldiers, pp 130-134, para 11-8d.

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GIVE BACK-PRESSURE ARMLIFT ARTIFICIAL RESPIRATION TO A CHEMICAL-AGENT CASUALTY

CONDITIONS

Given an unconscious soldier in a contaminated area who is not breathing but who cannot be given mask-to-mouth resuscitation (soldier with a facial injury, or a soldier who is being given first aid for blood agent poisoning).

STANDARDS

Clear the airway and give artificial respiration in accordance with the performance measures.

PERFORMANCE MEASURES

1. Shake the soldier's shoulder and shout, "Are you OK?" If the soldier answers, respiration is not needed.
2. If the soldier does not answer, call for someone to help you.
3. Kneel at the injured soldier's head. If in a contaminated area, kneel on a poncho or other material to avoid contamination from the ground.
4. Check to determine if he is breathing by watching for rise and fall of his chest.
5. If he is not breathing, put the soldier on his stomach with his face to one side, neck extended, and hands under his head (fig 1A).
6. Clear his upper airway.
   a. Clear his airway by removing any false teeth, dirt, vomit, mucus, or other material in the soldier's mouth. Use fingers wrapped with any uncontaminated cloth to clean the airway.
   b. If the casualty is masked, lift his mask below the chin, clear the airway, remove debris from the mask, and reseat the mask.

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PERFORMANCE MEASURES (cont)

7. Start respiration.

   a. Kneel at the soldier's head (fig 1A). Put your hands on his back, fingers extended, just below his shoulder blades.

   b. Rock forward, keeping your arms straight, and push straight down on the soldier's back (fig 1B).

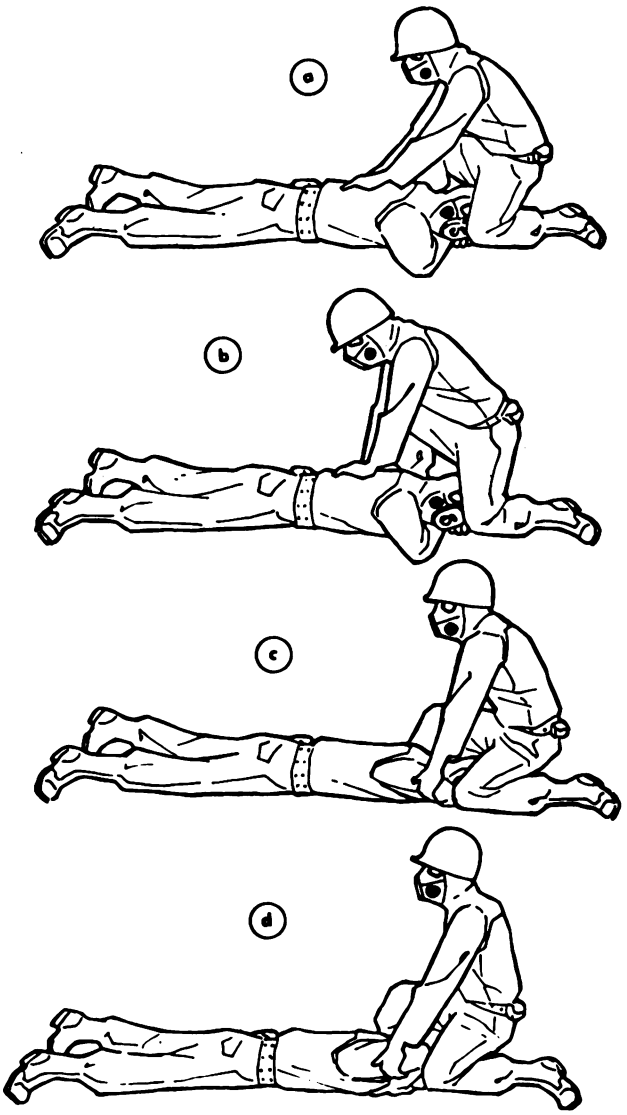

Figure 1. Back-pressure arm lift method of artificial respiration.

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PERFORMANCE MEASURES (cont)

Note. Do not allow your knee to make direct contact with any contaminated surface.

c. Rock back, grab his arms just above the elbows and pull toward his head until you feel resistance (fig 1C and 1D).

d. Move the soldier's arms back to their original position in line with the shoulders.

e. Repeat steps b, c, and d every 5 or 6 seconds.

8. Stop respiration.

a. Stop respiration when the soldier begins to breathe on his own. Watch him to make sure he does not stop breathing.

b. If the soldier fails to start breathing, continue respiration until the soldier breathes on his own, until relieved by medically trained personnel, or until you are too exhausted to continue.

REFERENCES

None.

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COMMUNICATE USING VISUAL SIGNALLING TECHNIQUES

CONDITIONS

Given a combat or field training situation with necessary flags or flashlights, and you are moving dismounted or mounted. Radio communications may not be available and radio silence may or may not be imposed.

STANDARDS

Demonstrate the correct procedure for each signal in the performance measures below.

PERFORMANCE MEASURES

1. Visual communication is a means available to all units. Visual signals are transmitted by flags, lights, pyrotechnics, panels, and arm-and-hand prearranged messages rapidly over short distances as well as for recognition and identification of friendly forces.

2. Visual signals also facilitate ease in controlling the action(s) or movement(s) of the follower and conversely visual signals can influence the action(s) or movement(s) of the leader.

3. It is important that you familiarize yourself with all the visual signals used on the battlefield. However, it is more important that you know those signals which can assist you in performing your specific job effectively in the event alternate means of communication are not available.

4. Signals for combat formations and battle drill.

    a. These signals may be used, as appropriate, by either mounted or dismounted troops. They give the soldier a means of communication between himself and other persons or units. They must be practiced until their use becomes second nature. Signals must be given correctly and distinctly.

    b. When a movement or action is to be executed by less than the total unit, the signaler will point, if necessary, toward the person(s) or element(s) of a unit as a warning that a signal will follow. However, when a movement or action is to be

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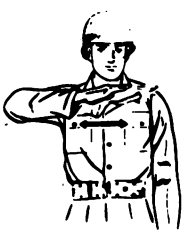
PERFORMANCE MEASURES (cont)

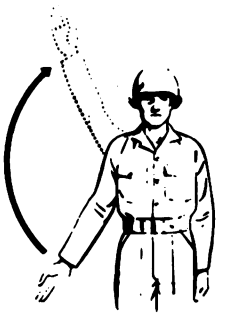
executed by the entire unit, the proper signal should be preceded by the signal ATTENTION. Most signals may be given from the ground or from a vehicle. Unless otherwise indicated in the illustrations, the signaler will face the person(s) or element(s) for which the signal is intended.

5. Listed below are selected visual signals. You should know these standard arm-and-hand signals.

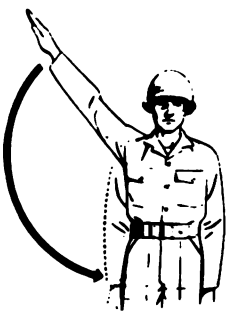
START ENGINES or PREPARE TO MOVE. Simulate cranking of engines by moving arm in a circular motion at waist level.



STOP ENGINES. Draw right hand, palm down, across the neck in a "throat cutting" motion from left to right.



MOUNT. With the hand extended downward at the side, with the palm 45° out, raise arm sideward and upward to an angle of 45° above the horizontal. Both arms may be used when giving this signal. Repeat until understood.



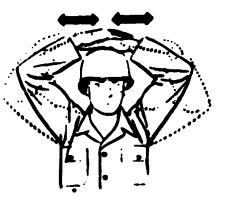
DISMOUNT or TAKE A PRONE POSITION. Extend arm sideward at an angle 45° above horizontal, palm down, and lower it to side. Both arms may be used in giving this signal. Repeat until understood.

MOVE (the vehicle(s)) FORWARD or COME FORWARD. Move hand(s) backwards and forwards with palm(s) toward the chest as if pulling the vehicle.

NEUTRAL STEER (tracked vehicles). Cross wrists at throat; point index finger in direction steer is to be made. Clench fist of other hand.

MOVE IN REVERSE (backup). Face the unit (vehicle) being signaled; raise hands to shoulder, level palms to front. Move hands forward and backwards as if pushing vehicle away.

CHANGE DIRECTION. Raise hands to shoulder level in front of the body. Form clenched fist on arm in direction turn is to be made. Make beckoning motion with other arm to bring vehicle forward. To reverse, make pushing motion.



BUTTON UP or UNBUTTON. To signal BUTTON UP, place both hands, one on top of the other, palms down on top of the helmet; with both arms back and in the same plane as the body. To signal UNBUTTON, give the BUTTON UP signal, then separate the hands, moving them slightly to each side in a slicing motion; repeat.

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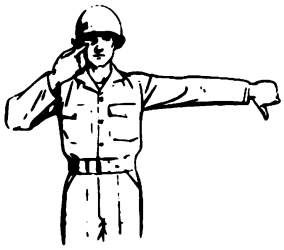
PERFORMANCE MEASURES (cont)

CLOSE UP DISTANCE BETWEEN VEHICLES AND STOP. Face the vehicle being signaled and extend forearms to the front, palms inward and separated by at least the width of the shoulders. Bring palms together as the distance shortens. The vehicle must stop when the palms come together.

STOP. (Alternate signal used to stop tracked vehicles.) Clasp the hands together, palms facing each other, at chin level.

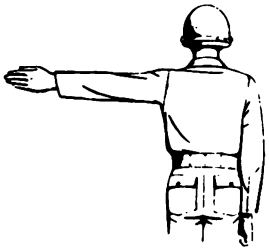
RAISE RAMP. (For use with vehicles with ramps.) Make circular motion with either hand at head level and the other arm extended across body.



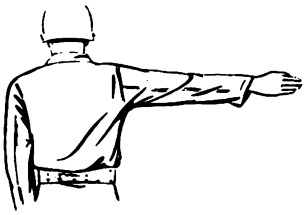
LIGHTS OFF. Index finger of right hand pointing towards eye and "thumbs down" signal with left hand.

LIGHTS ON. Index finger of both hands pointing towards eyes.

LOWER RAMP. (For use with vehicles with ramps.) Make circular motion with either hand pointing to the ground.



LEFT TURN or **COLUMN LEFT.** Extend left arm horizontally to the side, palm to the front.



RIGHT TURN or **COLUMN RIGHT.** Extend right arm horizontally to the side, palm to the front.

PASS AND KEEP GOING. Extend left arm horizontally to the side, palm to the front, and describe large circles to the front by rotating arm clockwise from the elbow.

ATTENTION. Extend the arm sideways, slightly above horizontal; palm to the front; wave arm to and away from the head several times.

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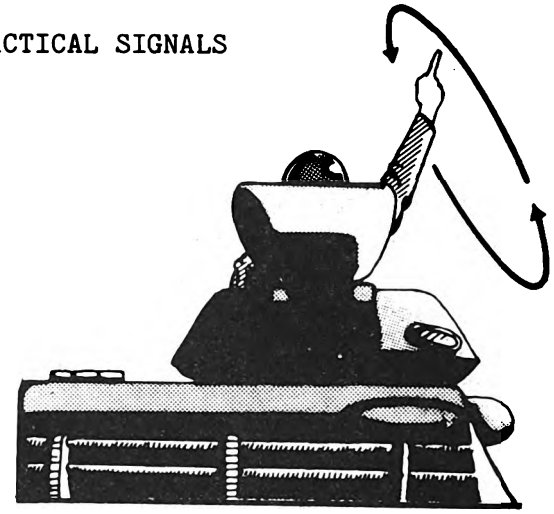
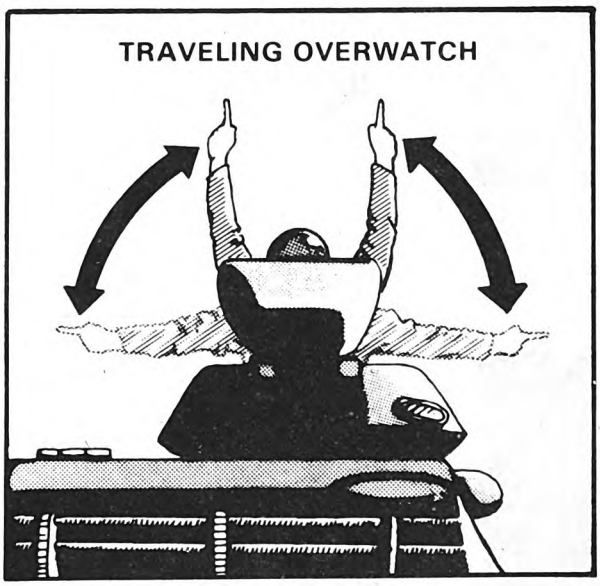
PERFORMANCE MEASURES (cont)

TACTICAL SIGNALS



TRAVELING. With the right hand and index finger fully extended upward, rotate your arm in a circular clock-wise motion.



TRAVELING OVERWATCH. With both arms and index fingers fully extended upward, lower your arms to a 90° angle at your side, then raise your arms upward again.

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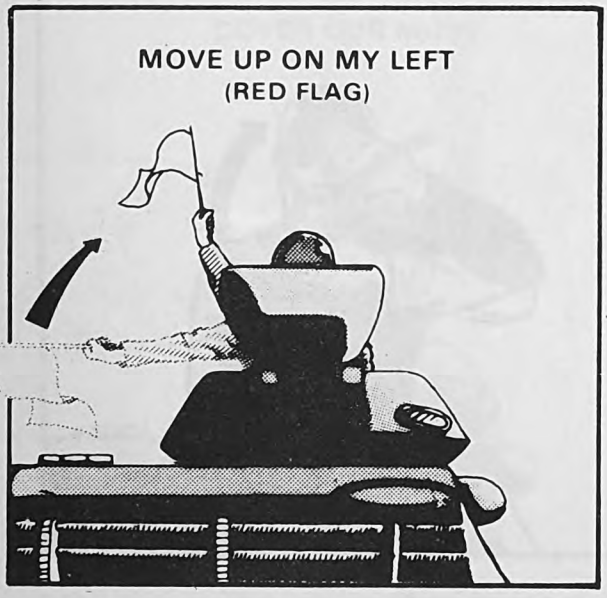
PERFORMANCE MEASURES (cont)



MOVE UP ON MY LEFT. Hold a red flag in your left hand. Move the flag from fully extended upward to a 90° position at your side, then raise it upward again.

MOVE UP ON MY RIGHT. Hold a red flag in your right hand. Move the flag from fully extended upward to a 90° position at your side, then raise it upward again.

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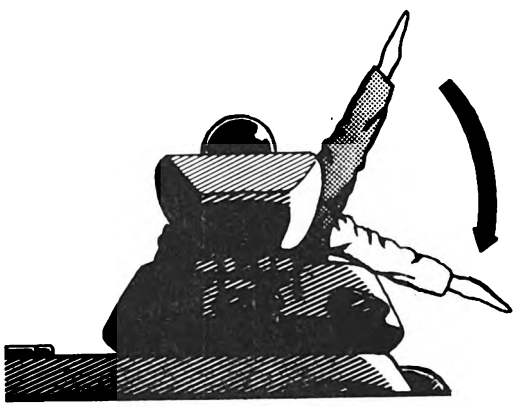
PERFORMANCE MEASURES (cont)

CEASE FIRING. Raise your hand in front of your forehead, palm to the front, and swing your hand and forearm up and down several times in front of your face.



DISMOUNT. Extend your arm sideways 45° above the horizontal, palm down, and lower it to your side. Both arms may be used in giving this signal. Repeat it until it is understood.

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PERFORMANCE MEASURES (cont)

COMMENCE FIRING. Extend your arm in front of your body, palm down, and move it through a wide horizontal arc several times.

FLAG SIGNALS

DANGER or ENEMY IN SIGHT. Holding a red flag, raise your arm to a vertical position.

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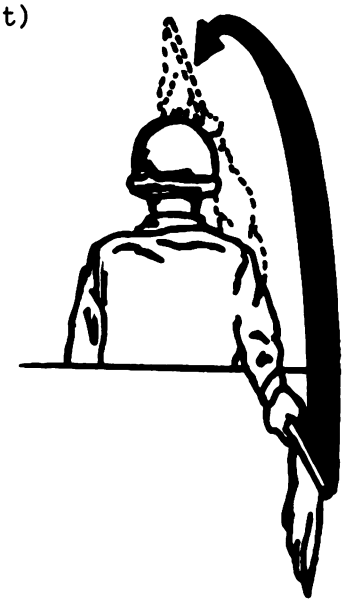
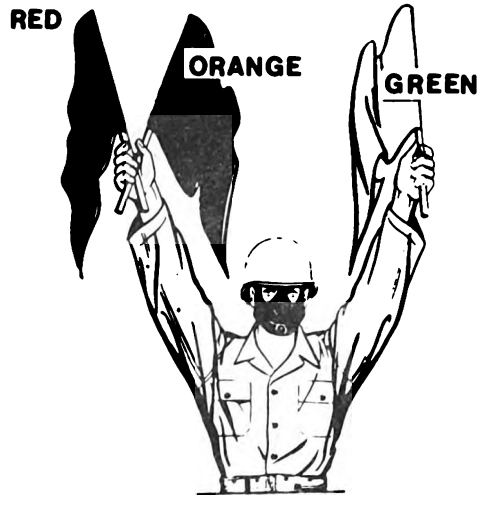
PERFORMANCE MEASURES (cont)



MOVE OUT. With your right arm holding an orange (yellow) flag fully extended behind you, raise it from a horizontal to a vertical position.



NBC HAZARD PRESENT. After masking, hold red and orange (yellow) flags overhead in your right hand and hold a green flag overhead in your left hand.

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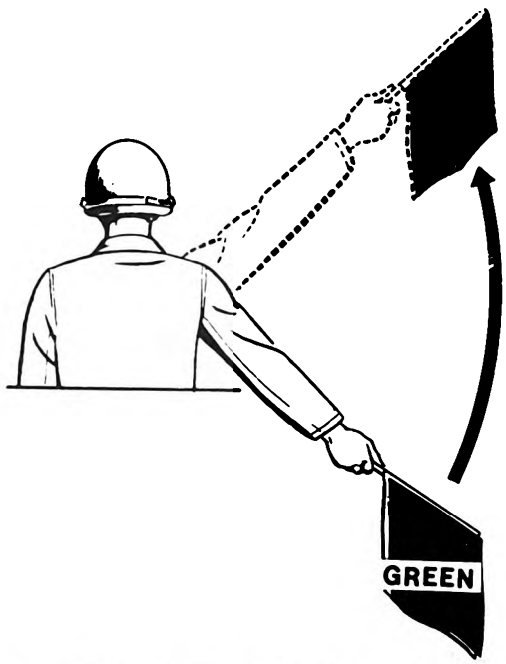
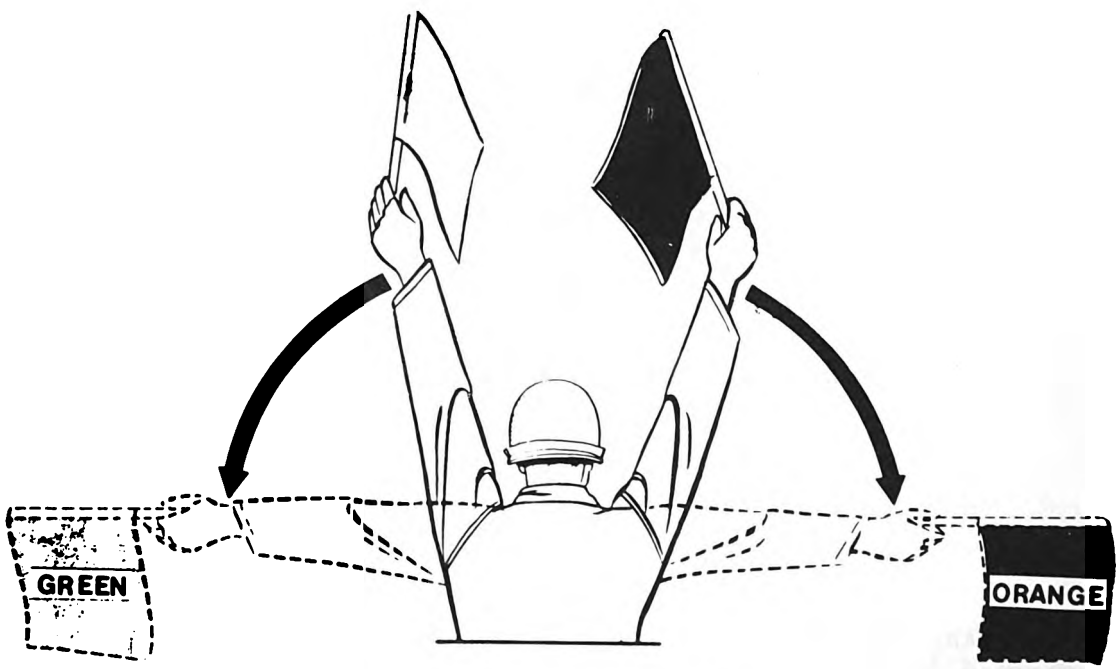
PERFORMANCE MEASURES (cont)



MOUNT. With your right arm fully extended at a 90° angle (flag optional), raise it to a fully extended upward position.



DISMOUNT. Move arms from vertical to horizontal.

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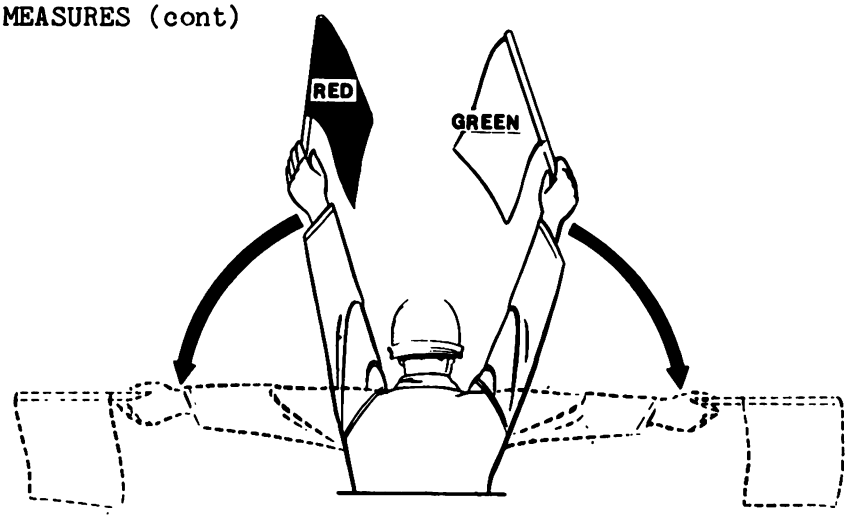
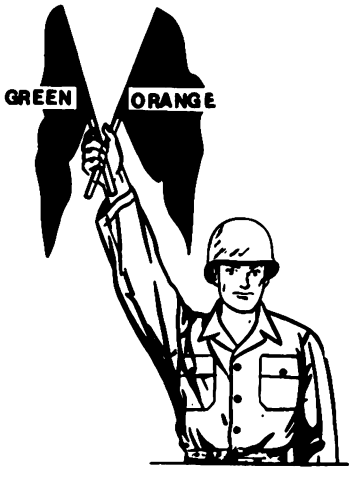
PERFORMANCE MEASURES (cont)



DISMOUNT AND ASSAULT. Move flags from vertical to horizontal.



ASSEMBLE or CLOSE. Hold orange (yellow) and green flags in the right hand overhead in a vertical position.

REFERENCES

FM 7-7, The Mechanized Infantry Platoon and Squad, app D, p 3.
FM 21-60, Visual Signals, chap 2, pp 2-2 thru 2-9, 2-15 thru 2-20; chap 3, pp 3-1 thru 3-9.
FM 71-1, Tank and Mechanized Infantry Company Team, pp 4-26 and 4-27, and app E.
TEC 936-061-0147-F, Visual Hand Signals.
Video Tape ARC-25-72, Hand and Arm Signals.
Video Tape ARS-45-74, Visual Signals.

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SEND OR RECEIVE A RADIOTELEPHONE MESSAGE

CONDITIONS

This task is performed under all weather conditions in a field or a garrison location and may be performed while wearing your individual M17 or M17A1 Field Protective Mask. Your tank commander or immediate supervisor will provide you with a CEOI, and ACP 125(D), paper, pencil, a distant radiotelephone station with which to communicate, a five-word encoded message, and an operational radiotelephone.

STANDARDS

The task standard has been met when you have sent or received the five-word message over radiotelephone according to performance measures 1 through 3 below and ACP 125(D).

PERFORMANCE MEASURES

1. Establish communications with the distant radiotelephone station. (Refer to CEOI and ACP-125(D), para 302, pp 3-1 and 3-2 of c1.)

   a. Determine your call sign and the distant radio station's call sign from your extract copy of the CEOI.

   b. Determine the operating frequency of the net to be entered from your extract copy of the CEOI.

   c. If operating in a directed net, perform the following: (Refer to ACP-125(D), para 305, pp 3-4 thru 3-6.)

      (1) Contact the NCS (A1D28) and request permission to enter the net.

      (2) Authenticate as required by the NCS.

      (3) Tell the NCS you have messages. Designate to whom the messages go and the level of precedence for each.

   d. If operating in a free net, perform the following: (Refer to ACP-125(D), para 304 thru 308, pp 3-4 thru 3-8 of c1.)

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PERFORMANCE MEANSURES (cont)

(1) Listen carefully to make sure no other stations are using the net.

(2) Key your radio set and call the distant station with whom you wish to communicate.

(3) When the distant station answers, advise the operator of the number of messages and the level of precedence for each message.

(4) Authenticate as required by the distant station.

2. Transmit your message. (Refer to fig 1 and ACP-125(D), para 307 thru 309, pp 3-8 thru 3-10.)

a. Advise the distant station that you are ready to transmit your message.

EXAMPLE: DELTA TWO CHARLIE WUN WUN--(THIS IS) ROMEO WUN HOTEL WUN WUN--ROUTINE--OVER.

b. Wait for the distant station operator to reply that he is ready to copy the message.

EXAMPLE: ROMEO WUN HOTEL WUN WUN--(THIS IS) DELTA TWO CHARLIE WUN WUN--ROGER--OVER.

c. Transmit the message in the format prescribed in ACP-125(D) (para 208 through 219, pp 2-3 thru 2-9).

EXAMPLE: DELTA TWO CHARLIE WUN WUN--(THIS IS) ROMEO WUN HOTEL WUN WUN

MESSAGE FOLLOWS

MESSAGE NUMBER WUN

TIME ZERO WUN ZERO ZERO ZERO WUN ALPHA JULY SEVEN EIGHT

FROM ROMEO WUN HOTEL WUN WUN

TO DELTA TWO CHARLIE WUN WUN

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PERFORMANCE MEASURES (cont)

GROUP FIRE

BREAK

ALPHA DELTA BRAVO LIMA DELTA ECHO ECHO ECHO HOTEL MIKE NOVEMBER ROMEO DELTA OSCAR NOVEMBER

BREAK

AUTHENTICATION IS LIMA LIMA (sent only as required)

OVER

d. Obtain an acknowledgement of the message from the distant radio station along with a receipt time.

EXAMPLE: ROMEO WUN HOTEL WUN WUN--(THIS IS) DELTA TWO CHARLIE WUN WUN--ROGER MESSAGE NUMBER WUN--TIME--ZERO WUN ZERO ZERO WUN ZERO JULY SEVEN EIGHT--OUT.

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PERFORMANCE MEASURES (cont)

TRANSMITTING STATION:	R1H11
RECEIVING STATION:	D2C11
SAMPLE MESSAGE:	ADB LDE EEH MNR DON
DATE TIME GROUP:	010001A JULY 78

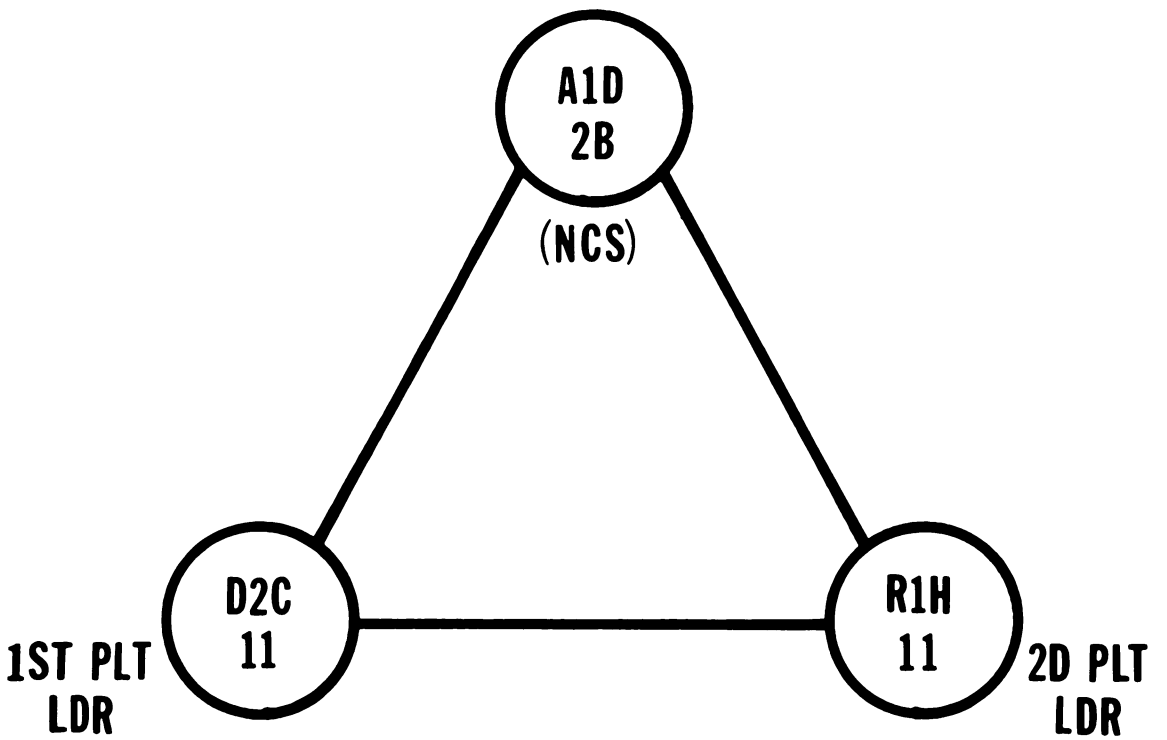

Figure 1. Simple net diagram with five-word encoded message.

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PERFORMANCE MEASURES (cont)

3. Receive a radiotelephone message. (Refer to ACP-125(D), para 307 thru 309, pp 3-8 thru 3-10.)

   a. Reverse the procedures in performance measure 2 above.

   b. Make sure you copy the message as it is sent and that you place it in proper format before delivery.

   c. Make sure you are using the correct decode set to decode the message by referring to your CEOI.

   d. Request repetitions of the message according to ACP-125(D) (para 311, pp 3-12 thru 3-15).

REFERENCES

Communications-Electronics Operation Instructions (CEOI).
ACP-125(D), Communication Instructions Radiotelephone Procedure, w/C1 and 2.
TEC 936-061-0108-F, Initiating and Responding to Radio Calls.
TEC 936-061-0109-F, Writing Down Messages Received by Radio.
TEC 936-061-0110-F, Responding to Messages.
TEC 936-061-0111-F, Preparing Messages to be Sent.
TEC 936-061-0112-F, Sending and Receiving Messages.
TEC 936-061-0113-F, Enter, Leave Radio Net, Authenticate.
TEC 936-061-0114-F, Practice and Self-Evaluation.

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ENTER AND LEAVE A RADIO NET

CONDITIONS

Given a radio net, authentication table, call signs, suffixes, operating frequency, operational radio set, and a net control station (NCS).

STANDARDS

1. Enter a radio net within 2 minutes.
2. Leave a radio net within 2 minutes.

PERFORMANCE MEASURES

1. Enter a radio net (example 1).
   a. Determine your call sign and suffix, the call sign and suffix of the NCS, and frequency of the selected net.
   b. Select the correct authentication table from the CEOI.
   c. Operate the radio.
   d. Call the NCS and request permission to enter the net (example 1). (See Task Summary 113-571-1005, Send or Receive a Radiotelephone Message.)
   e. Respond with the correct authentication. The NCS will "ROGER" your authentication (if correct), and grant you permission to enter the net.

EXAMPLE 1:

U4I07--THIS IS A6B06--OVER.
A6B06--THIS IS U4I07--OVER.
U4I07--THIS IS A6B06--REQUEST PERMISSION TO ENTER YOUR NET.
A6B06--THIS IS U4I07--AUTHENTICATE AB.
U4I07--THIS IS A6B06--I AUTHENTICATE C--OVER.
A6B06--THIS IS U4I07--ROGER--PERMISSION GRANTED TO ENTER THIS NET--OUT.

2. Leave a radio net (example 2).
   a. Call the NCS and request permission to leave the net.

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PERFORMANCE MEASURES (cont)

b. Give the correct authentication after the NCS calls you and asks you to authenticate. The NCS will "ROGER" your authentication.

Note. The NCS has the authority to deny you permission to enter or leave a radio net.

EXAMPLE 2:

U4I07--THIS IS A6B06--OVER
A6B06--THIS IS U4I07--OVER
U4I07--THIS IS A6B06--REQUEST PERMISSION TO LEAVE THE NET
A6B06--THIS IS U4I07--AUTHENTICATE ND--OVER
U4I07--THIS IS A6B06--I AUTHENTICATE H--OVER
A6B06--THIS IS U4I07--ROGER--PERMISSION GRANTED TO LEAVE THE NET--OUT.

REFERENCES

FM 24-18, Field Radio Techniques.
TEC 936-061-0113-F, RTP: Part 5, Entering and Leaving a Radio Net and Authenticating.
Unit CEOI.

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INSTALL RADIO SET AN/PRC-77 OR AN/PRC-25

CONDITIONS

This task is performed under all weather conditions in a field or a garrison location and may be performed in an NBC situation. Your tank commander will provide you with a Radio Set AN/PRC-77(25), TM 11-5820-667-12, Handset H-189/GR, and Battery Dry BA-4386/PRC-25.

STANDARDS

This task has been performed correctly when, in 3 minutes, the battery is installed in the battery box and in the radio without causing damage to the battery or radio, the antenna is erected, the handset is connected, and the radio set is ready to be aligned and operated in accordance with performance measures 1 thru 4 below.

PERFORMANCE MEASURES

1. Insert the battery (see fig 1 and TM 11-5820-667-12, chap 2, para 2-4, p 2-2.

   a. Do not install the battery BA-4386 until you are certain the air vent in battery box is operational. With valve depressed, air should pass from outside, and when valve is closed, air should not flow. Be sure to tighten the pressure test screw and the pressure relief valve prior to installing battery.

   b. When you place the battery in the battery box, DO NOT BREAK the floating connector.

   c. Replace the battery box and close latches.

      CAUTION: Remove the battery when the equipment is not in use for more than 1 day.

2. Erect the Antenna AT-892/PRC-25. Do not remove the plastic locking device on threads of connector (see TM 11-5820-667-12, chap 2, para 2-6a, p 2-5.

3. Erect the Antenna AT-271A/PRC (see TM 11-5820-667-12, chap 2, para 2-6b, p 2-5.

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PERFORMANCE MEASURES (cont)

WARNING: When you install this antenna, be certain you have a clear overhead to avoid contact with electrical wires.

4. Attach Handset H-189/GR to either audio connector on radio.

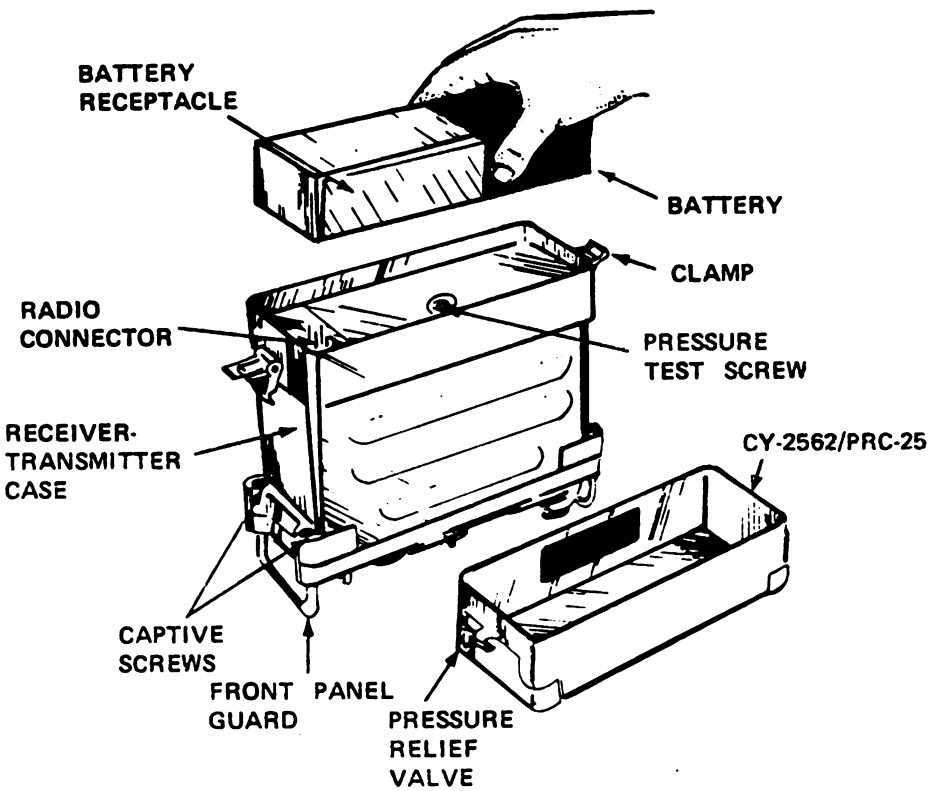

Figure 1. Installing battery in receiver-transmitter.

REFERENCES

TM 11-5820-667-12, Operator's and Organizational Maintenance Manual Including Repair Parts Lists: Radio Set AN/PRC-77 (Including Receiver-Transmitter, Radio RT-841/PRC-77), w/c1 thru 5.
TEC 201-113-4501-F, Preparation of AN/PRC-77 for Operation, Part I: Installation.
Army Correspondence Course SS9 735, Operation of Radio Set AN/PRC-77 (SOJT).

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INSTALL RADIO SET AN/VRC-64 WITH OR WITHOUT INTERCOM

CONDITIONS

Given:

1. Radio Set AN/VRC-64.
2. Antenna AS-1729/VRC or antenna AT-912/VRC.
3. AN/VIC-1(V), installed and operational (for track vehicles).
4. Antenna tie-down kit.
5. Operational vehicle with MT-1029/VRC mount and antenna matching unit base installed (wheel).
6. TM 11-5820-498-12.

STANDARDS

Within 5 minutes, the radio set with the AM-2060(A) amplifier must be secure in the mount.

PERFORMANCE MEASURES

1. Insert amplifier-power supply OA-3633/GRC or OA-3633A/GRC into mount MT-1029/VRC (see TM 11-5820-498-12, chap 2, sec II, para 2-5d, p 2-5).

WARNING: Do not permit man pack or vehicular whip antennas to come in contact with high power lines or other sources of electricity--injury or death could result.

Do not start the vehicle engine, restart it, slave it, or stop it with the AM-2060/GRC or AM-2060(A)/GRC turned on. The AM-2060/GRC or AM-2060A/GRC power switch must be set to OFF. Install warning decals as instructed in SB 11-624.

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PERFORMANCE MEASURES (cont)

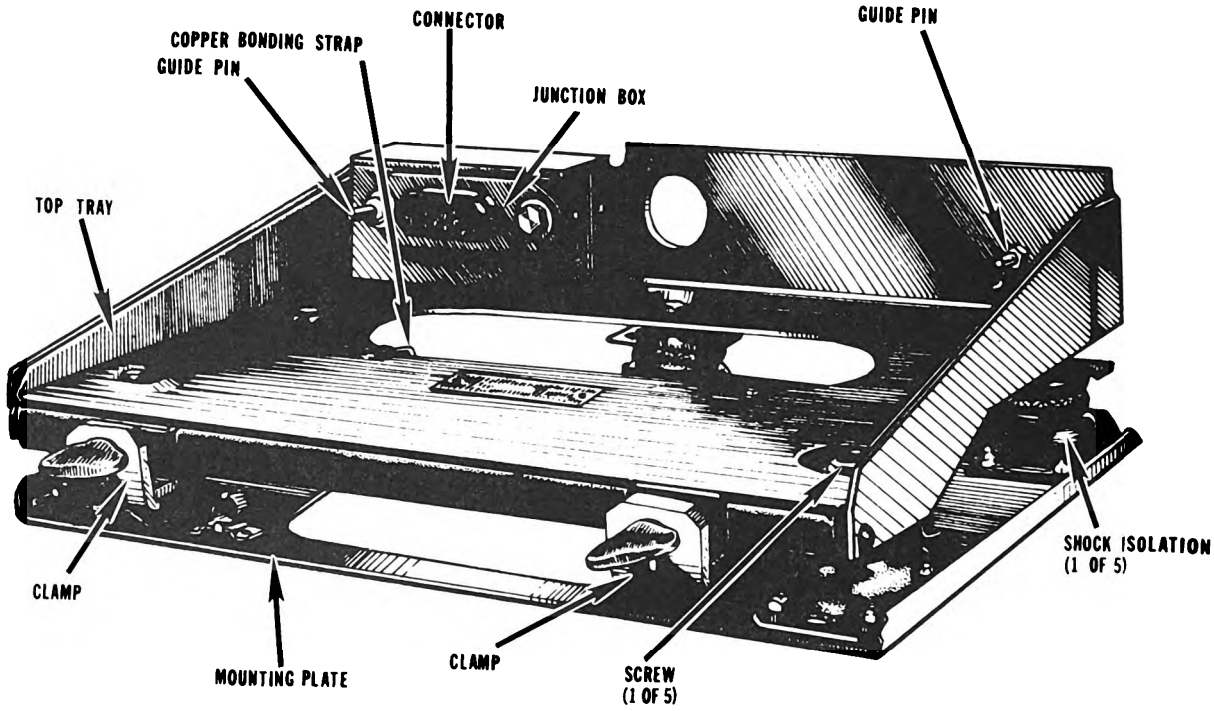

Figure 1.

a. Loosen the clamps on the MT-1029/VRC mount (fig 1).

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PERFORMANCE MEASURES (cont)

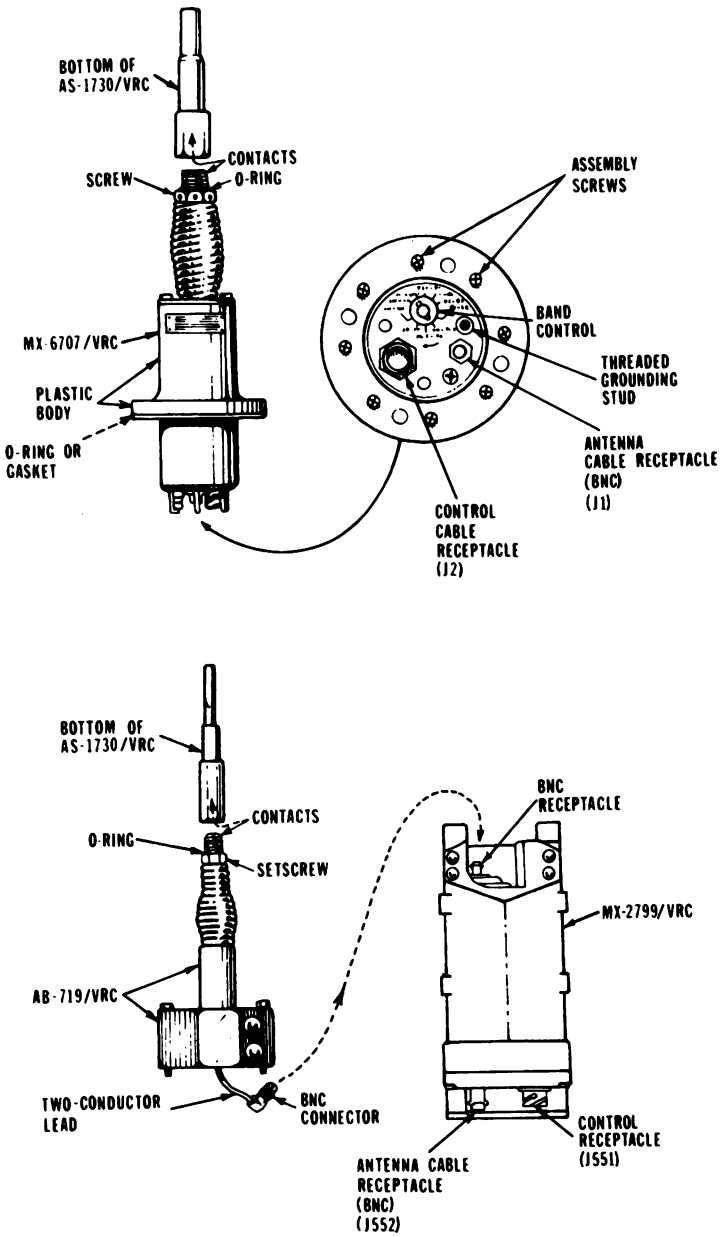

Figure 3. Antennas AS-1729/VRC and AT-912/VRC, matching unit details.

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PERFORMANCE MEASURES (cont)

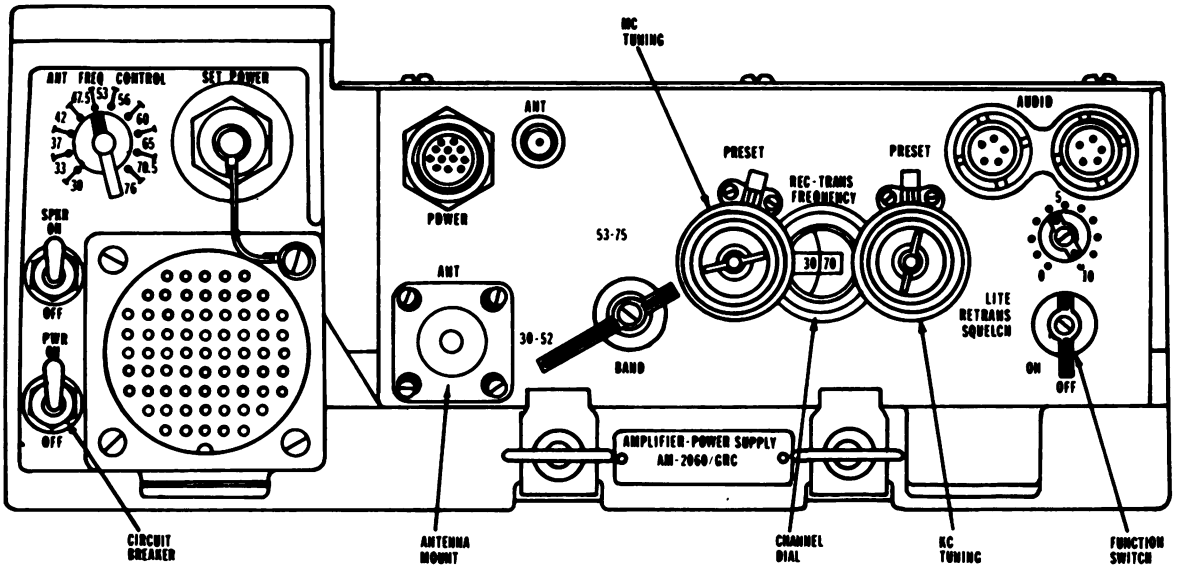

Figure 4. Amplifier-power supply and receiver-transmitter, controls, indicators, and connectors.

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PERFORMANCE MEASURES (cont)

c. Mate the power input connector (fig 2) of the amplifier-power supply with the connector (fig 2) on the MT-1029/VRC junction box. Be sure the guide pins (fig 1) of the MT-1029/VRC are aligned with the guide pin holes (fig 2) of the amplifier-power supply.

d. Push the amplifier-power supply back on the MT-1029/VRC.

e. Engage the clamps (fig 1) on the MT-1029/VRC with the clamp recesses (fig 2) of the amplifier-power supply and tighten the clamps securely.

f. Connect the CX-4722/VRC cable assembly between the amplifier-power supply antenna control connector and connector J-552 of Antenna Matching Unit MX-2799/VRC or connector J2 of Antenna Matching Unit MX-6707/VRC (fig 3).

Note. For track vehicles it will be easier to attach the cable before securing the AM-2060(A)/GRC amplifier.

WARNING: The antenna control connector on the back of the amplifier-power supply is female and the one on the At-912/VRC or AS-1729/VRC is male. Connect the corresponding mating end of the CX-4722/VRC cable assembly accordingly. Improper mating damages the pins of the cable connector or the pins in the antenna matching units.

g. Line up the key in the receptacle with the slot in the cable connector. Then press in on the cable connector and turn the cable connector sleeve to lock the cable connector to the receptacle.

2. Insert the receiver-transmitter into the amplifier-power supply (see TM 11-5820-498-12, chap 2, sec II, para 2-5e, pp 2-5 thru 2-6).

a. Loosen the mounting clamps on the front of the amplifier-power supply (fig 2). They will then drop slightly.

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PERFORMANCE MEASURES (cont)

b. Slide the receiver-transmitter into the amplifier-power supply until the bottom of the receiver-transmitter is flush with the bumper plate of the amplifier-power supply.

c. Raise the mounting clamps until they engage the lips on the panel of the receiver-transmitter. Then tighten the mounting clamps.

d. Remove the protective cap from the power connector on the front of the receiver-transmitter (fig 4).

e. Connect the CX-4655/GRC cable assembly between the amplifier-power supply set power connector and the receiver-transmitter power connector (fig 4).

f. Connect the CG-1773/U cable assembly between the receiver-transmitter ANT connector, and connector J551 of the MX-2799/VRC or connector J1 of the MX-6707/VRC (figs 3 and 4).

3. Erect the vehicular antenna and antenna tie-down kit (see TM 11-5820-498-12, chap 2, sec II, para 2-5f, p 2-6).

a. Install the antenna tip cap to the top section of the antenna.

b. Tie the antenna down using the antenna tie-down kit provided with the AT-912/VRC and AS-1729/VRC, whenever the antenna is not being used or you do not wish to antenna upright for any reason.

WARNING: Avoid antenna contact with power lines. Antenna must be at least 9 feet above the ground.

REFERENCES

TM 11-5820-498-12, Operator's Manual for Radio Set AN/VRC-64.

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INSTALL RADIO SET AN/VRC-46 WITH INTERCOM

CONDITIONS

Given:

1. Radio Set AN/VRC-46.
2. Antenna AS-1729/VRC or Antenna AT-912/VRC.
3. An operational vehicle with an MT-1029/VRC mount and matching unit base and an AN/VIC-1 intercom system already installed.
4. TM 11-5820-401-12 and TM 11-5820-401-10-2.

STANDARDS

Within 5 minutes, the radio set must be mounted securely in the vehicle, the RF cable must be attached to the radio set and the antenna matching unit, and the antenna matching unit cable must be attached to the radio set and the antenna matching unit.

PERFORMANCE MEASURES

1. Make sure the MX-7778(A) suppressor and the AM-1780/GRC are off.
2. Make sure the power switch on the receiver-transmitter is turned to OFF (see TM 11-5820-401-12, chap 1, fig 1-15; chap 2, sec II, p 2-2).
3. Clean the surface of the MT-1029/VRC mount and remove the electrical connector cover from the radio receptacle (see TM 11-5820-401-12, chap 2, fig 2-7; chap 2, sec II, para 2-5a(6), p 2-3).
4. Insert the receiver-transmitter into the MT-1029/VRC (see TM 11-5820-401-12, chap 2, sec II, para 2-5b(1), p 2-3).

   WARNING: The receiver-transmitter weighs over 50 pounds. Use extreme care when handling to protect yourself from injury and the equipment from damage. Never lift or carry the receiver-transmitter by only one handle.

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PERFORMANCE MEASURES (cont)

5. Tighten the MT-1029/VRC clamps to keep the radio from falling out during mobile operation (see TM 11-5820-401-12, chap 2, sec II, para 205b(1), p 2-3).

6. Complete cabling (see TM 11-5820-401-12, chap 2, sec II, para 2-5b(2)(3) and (7), p 2-3).

7. Erect the AS-1729/VRC or AT-912/VRC antenna (see TM 11-5820-401-12, chap 2, sec II, paras 2-7a and b, p 2-5).

   Note. Apply a little graphite grease to the threads of the antenna sections for easy removal and to prevent the sections from seizing if they have been rarely removed.

   a. Place the antenna tip cap on the antenna.

   b. Screw the antenna sections together. Screw antenna to antenna securely. Do not over-tighten.

   c. Use the antenna tie-down assembly to secure the antenna to the forward part and above the top of the vehicle (see TM 11-5820-401-12, chap 2, sec II, para 2-7c, pp 2-5 thru 2-7).

   d. Tie it so that personnel are not endangered (not less than 9 feet height).

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PERFORMANCE MEASURES (cont)

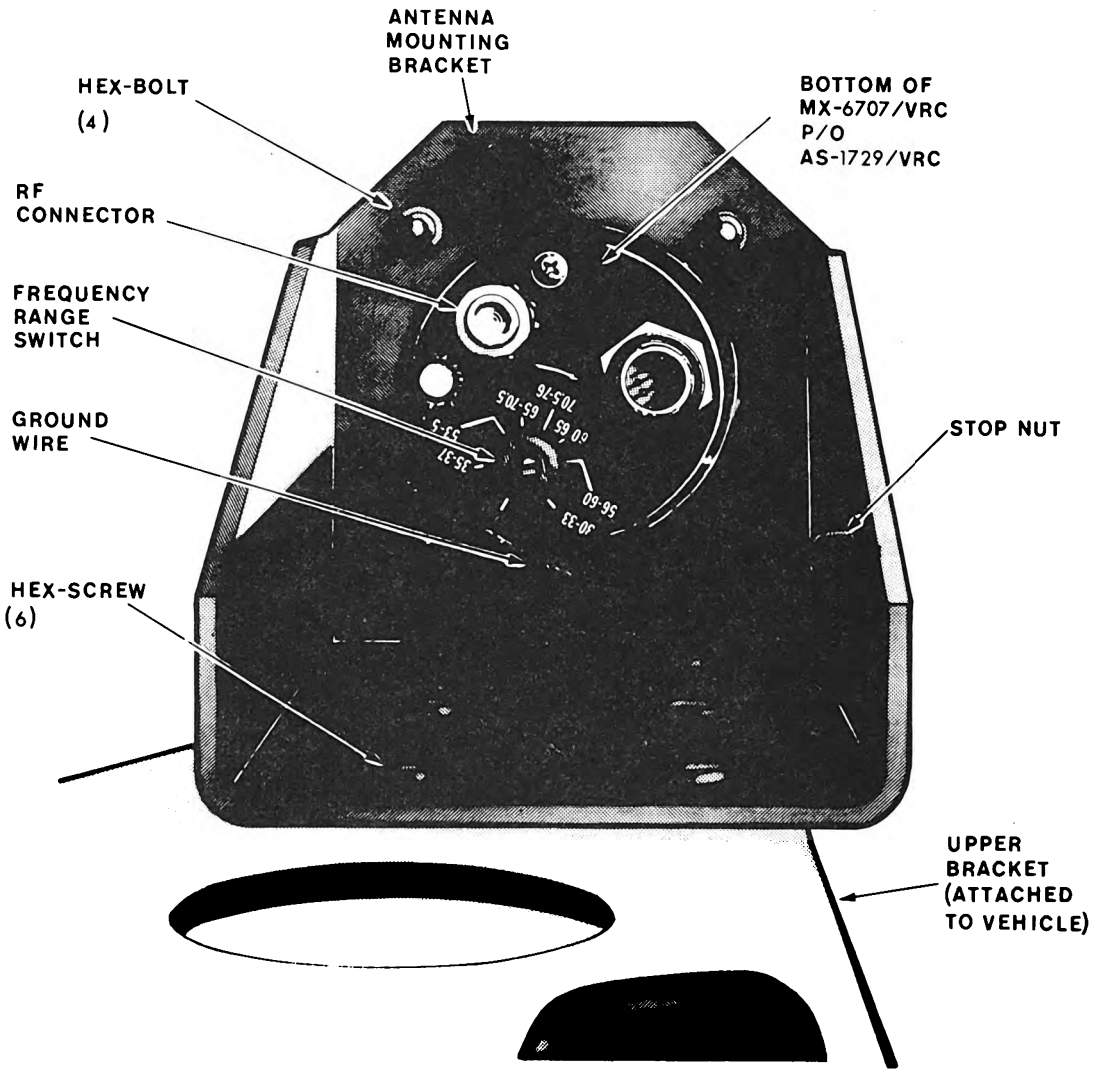

Figure 1. MX 6707/VRC installed in bracket on vehicle.

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PERFORMANCE MEASURES (cont)

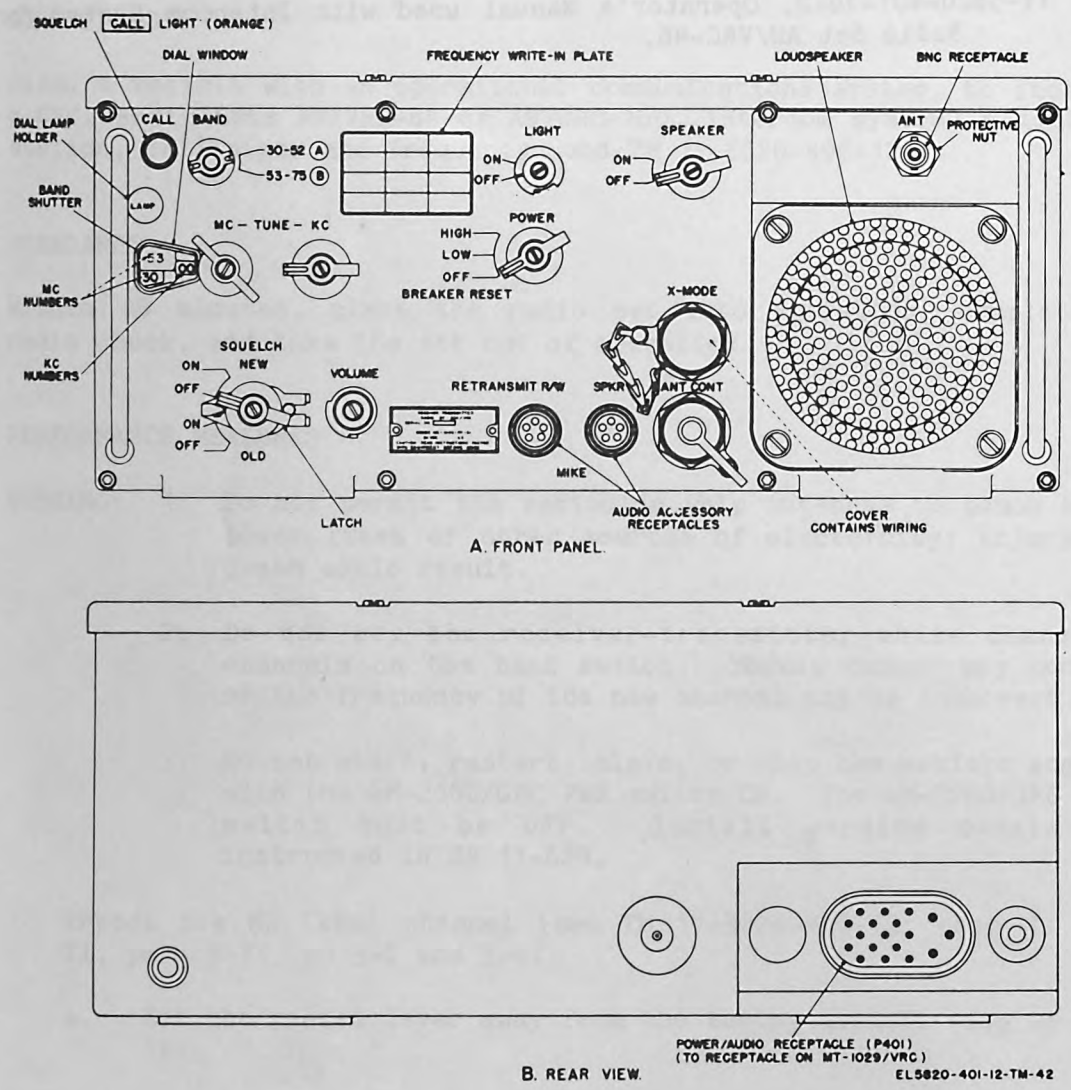

Figure 2. RT-524 (*)/VRC controls, indicators, and receptacles.

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TASK SUMMARY 113-587-1043 (cont)

REFERENCES

TM 11-5820-401-12, Operator's Manual for Radio Set AN/VRC-46.
TM 11-5820-401-10-2, Operator's Manual used with Intercom System for Radio Set AN/VRC-46.

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OPERATE RADIO SET AN/VRC-64 OR AN/GRC-160 WITH INTERCOM SYSTEM

CONDITIONS

Given a vehicle with an operational communications system, to include a CVC, Radio Sets AN/VRC-64 or AN/GRC-160, intercom system, a monitor station, call signs and frequency, and TM 11-5820-498-12.

STANDARDS

Within 10 minutes, place the radio set into operation, complete a radio check, and take the set out of operation.

PERFORMANCE MEASURES

WARNING:
1. Do not permit the vehicular whip antennas to touch high power lines or other sources of electricity; injury or death could result.
2. Do not key the receiver-transmitter while changing channels on the band switch. Module damage may occur, or the frequency of the new channel may be incorrect.
3. Do not start, restart, slave, or stop the vehicle engine with the AM-2060/GRC PWR switch ON. The AM-2060/GRC PWR switch must be OFF. Install warning decals as instructed in SB 11-624.

1. Preset the KC (kHz) channel (see TM 11-5820-498-12, chap 3, sec II, para 3-11, pp 3-8 and 3-9).
   a. Set the preset lever away from the tuning control (fig 1A and 1B).
   b. Set the tuning control so that the lower frequency appears in the channel dial.
   c. Position the preset lever forward against the control (fig 1C), and loosen the wing nut on the control.

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PERFORMANCE MEASURES (cont)

d. Pull up on the lower section of the control and turn it counterclockwise until the stop on the lower section strikes the preset lever. Tighten the wing nut.

e. Position the preset lever away from the control.

f. Turn the control until the higher frequency appears in the channel dial (both sections move).

g. Loosen the wing nut and position the preset lever forward against the control.

h. Without disturbing the setting of the lower section, pull on the upper section and turn it clockwise until its stop strikes the preset lever (fig 1B).

i. Keeping the upper section against the preset lever, tighten the wing nut.

j. Check the settings by turning the control counterclockwise and clockwise for their respective settings.

2. Preset the MC (MHz) channel.

a. The procedure for presetting the lower and upper sections of the MC (megaHertz) knob for MC frequencies in the same band is the same as that for the KC knob (see performance measure 1).

b. When presetting the MC control for frequencies in different bands, always set the lower section to the lower MC frequency. For example, 54 MHz is lower in its band (53-75) than 33 MHz is in its band (30-52). 54 MHz would be preset on the lower section, and 33 MHz on the upper section. To preset the MC control section in this case, set the band switch to the appropriate band, and then use the same procedure as for the KC control.

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PERFORMANCE MEASURES (cont)

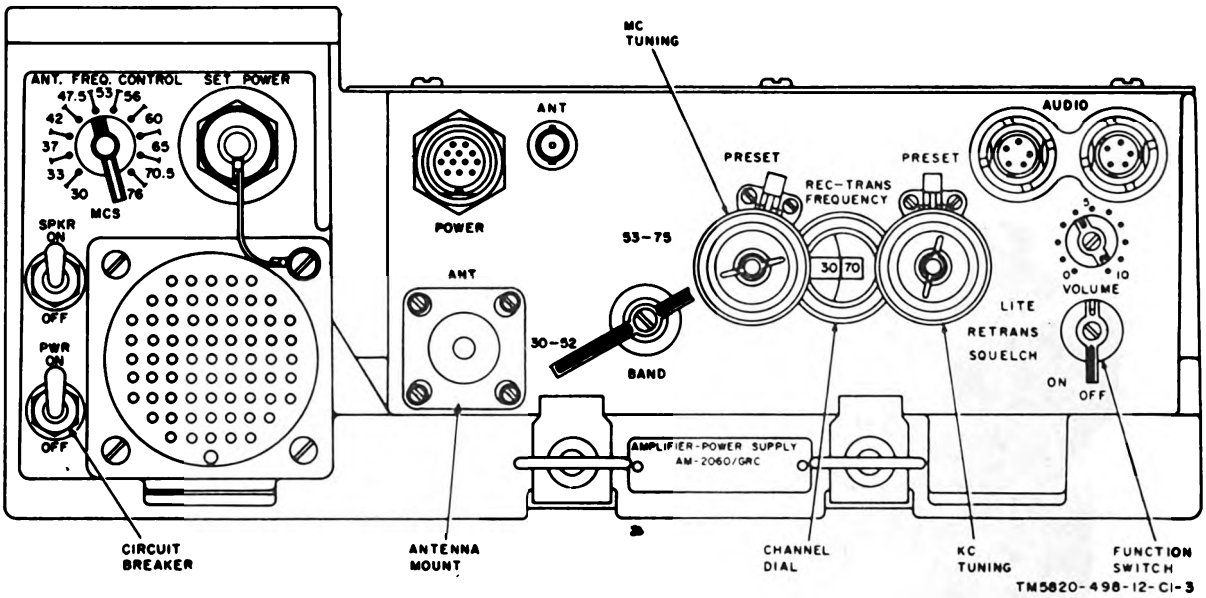

Figure 2.

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PERFORMANCE MEASURES (cont)

3. Apply power to the radio set.

   a. Make sure vehicle power is on.

   b. Turn the Voltage Suppressor to the ON position (if applied).

   c. Tune the AM-1780.

      (1) Turn the main power switch to NORM.

      (2) Turn the power circuit breaker to ON.

      (3) Turn the INT ACCENT to OFF.

      (4) Turn the radio TRANS switch to CDR + CREW.

      (5) Make sure the installation switch is at OTHER.

4. Tune the amplifier-power supply group AM-2060A. (For DA-3633 or DA-3633/A refer to TM 11-5820-498-12, chap 3, sec II, para 3-14, pp 3-12 and 3-13.)

   a. Connect the CVC helmet.

   b. Turn the amplifier-power supply PWR switch to ON.

   c. Set the amplifier-power supply SPKR switch to OFF.

   d. Adjust the receiver-transmitter VOLUME control to the desired level (maximum).

   e. Set the ANT FREQ CONTROL switch of the amplifier-power supply to the corresponding frequency range that is set on the radio set.

5. Operate the RT 841/PRC-77 (see TM-11-5820-498-12, chap 3, sec II, para 3-13, pp 3-11 and 3-12).

   a. Set the FUNCTION switch to ON (fig 2).

   b. Set the BAND switch at 30-52 or 53-75, depending on the frequency being used (fig 2).

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PERFORMANCE MEASURES (cont)

c. Utilize the preset or turn the MC tuning and KC tuning controls so that the desired frequency shows in the frequency window.

d. Set the VOLUME control for the desired sound level in the speaker/handset.

WARNING: Do not force the VOLUME control past its stop.

Note. The volume control on the face of the RT-841 controls the signal output of the handset (audio connectors) and the speaker on the AM-2060.

e. Adjust the frequency control on the AM-2060.

6. Determine the squelch setting for the receiver-transmitter, and align the squelch control to the appropriate setting.

7. Make a radio check with the monitor station. (See Task Summary 113-571-1005, Send or Receive a Radiotelephone Message.)

8. Perform stopping procedures (see TM 11-5820-498-12, chap 3, sec II, para 3-14k, pp 3-12 and 3-13).

a. Set the AM-2060/GRC PWR switch to OFF.

b. Turn the receiver-transmitter FUNCTION switch to OFF.

c. Clear the frequency from the radio set by turning the MC and KC knobs in either direction.

d. Turn the AM-1780 main power and circuit breaker switches to OFF.

REFERENCES

TM 11-5820-498-12, Radio Sets AN/VRC-64 and AN/GRC-160.
Unit CEOI (Training).

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OPERATE RADIO SET AN/VRC-46 OR AN/VRC-12 WITH INTERCOM SYSTEM

CONDITIONS

Given a vehicle with an operational communications system, to include a CVC, AN/VRC-46 or AN/VRC-12, intercom system, call signs and frequency, a monitor station, and TM 11-5820-401-12.

STANDARDS

Within 5 minutes, place the radio set into operation, complete a radio check, and take the set out of operation.

PERFORMANCE MEASURES

1. Make sure vehicle power is on.

2. Make sure the voltage suppressor MX-7778(A) is ON.

   Note. Voltage suppressor should be on at all times.

3. Align the AM-1780.

   a. Turn the main power switch to NORM.
   b. Turn the circuit breaker ON.
   c. Turn the INT accent switch to OFF.
   d. Turn the RADIO TRANS to CDR & CREW.

4. Tune the receiver-transmitter (see TM 11-5820-401-12, chap 3, sec II, para 3-17A, B, C, D, pp 3-23 thru 3-25).

   WARNING: Do not start or stop the vehicle while the radio is on or you may damage the set.

   a. Turn the POWER switch to LOW.
   b. Turn the LIGHT switch to ON.
   c. Turn the SQUELCH switch to the desired mode of operation.
   d. Turn the BAND switch to the position of the operating frequency.
   e. Turn the MC control to the desired frequency.
   f. Turn the KC control to the desired frequency.

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PERFORMANCE MEASURES (cont)

g. Adjust the volume control to MID range.

Note. The volume control does not affect the transmitting distance of the radio set. It only controls the audio listening level. The volume control on the receiver-transmitter does not control volume of any signal through the intercom system.

5. Make a radio check with the monitor station (see Task Summary 113-571-1005, Send or Receive Radiotelephone Message).

6. Perform stopping procedures (see TM 11-5820-401-12, chap 3, sec II, para 3-17c(6), p 3-24).

a. Turn the radio power switch OFF.
b. Clear the frequency from the receiver-transmitter.
c. Turn the main power switch and the circuit breaker on the AM-1780 to OFF.

REFERENCES

TM 11-5820-401-12, Operator's Manual for AN/VRC-12 and AN/VRC-46 Radio Sets.

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OPERATE RADIO SET AN/PRC-77, AN/PRC-25, OR AN/GRC-160 (DISMOUNTED)

CONDITIONS

This task is performed under all weather conditions in a field or a garrison location, and may be performed in an NBC situation. Your tank commander will provide you with an operational Radio Set AN/PRC-77 or AN/PRC-25, TM 11-5820-667-12 or TM 11-5820-398-12, and CEOI.

STANDARDS

This task has been performed correctly when, in 3 minutes, the radio set has been aligned in accordance with the requirements in figure 1, and the radio set has been placed into and taken out of operation in accordance with performance measures 1 thru 3 below.

PERFORMANCE MEASURES

1. Determine operating frequency from the current CEOI (see Task Summary 113-571-1005, Send or Receive a Radiotelephone Message).

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PERFORMANCE MEASURES (cont)

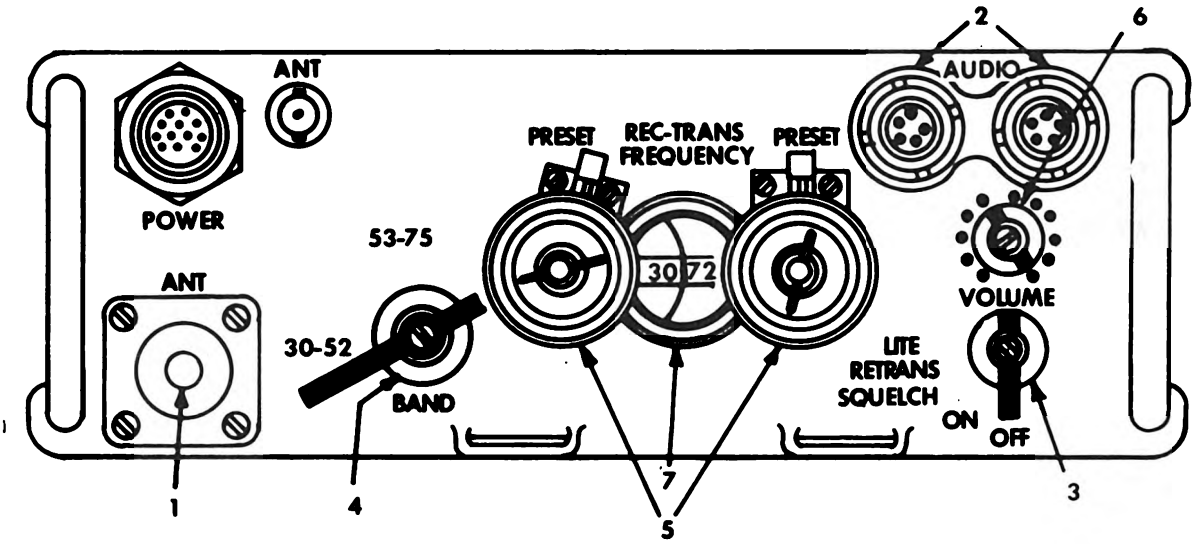

Figure 1. Condensed Operating Instructions for Radio Set AN/PRC-77.

2. Set the frequency using megahertz (MHz) and kilohertz (kHz) tuning control knobs (see fig 1 and TM 11-5820-667-12, chap 3, para 3-2, pp 3-1 thru 3-4).

   a. Install the antenna required for the type of operation in the ANT mount (1).
   b. Attach handset H-189/GR to either audio connector (2).
   c. Turn the function switch (3) to on.
   d. Turn the band switch (4) to the desired operating frequency band.
   e. Turn the MC tuning and KC tuning control knobs (5) until the desired frequency appears in the channel dial (7).
   f. Turn the volume control (6) to 4.
   g. Press the handset H-189/GR PUSH-TO-TALK switch and speak into handset. Release the PUSH-TO-TALK switch to listen.
   h. Adjust the volume control (6) for a desirable sound level.
   i. To reduce the rushing noise when no signal is being received, turn switch (3) to SQUELCH.

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PERFORMANCE MEASURES (cont)

3. Perform stopping procedures (see fig 1 and TM 11-5820-667-12, chap 3, para 3-5, pp 3-5). To turn set off, turn the function switch (3) to OFF.

REFERENCES

TM 11-5820-667-12, Operator's and Organizational Maintenance Manual Including Repair Parts Lists: Radio Set AN/PRC-77 (Including Receiver-Transmitter, Radio RT-841/PRC-77), w/c1 thru 5.
TEC 201-113-4502-F, Preparation of AN/PRC-77 for Operation, Part 2: Operation Checks.
TEC 201-113-4503-F, Preparation of AN/PRC-77 for Operation, Part 3: Pre-sets.
TEC 201-113-4545-A, Maintenance of Circuit Log and Operator Number Sheet.
TEC 201-113-4550-E/A, Calling and Answering, Part 1.
TEC 201-113-4551-E/A, Calling and Answering, Part 2.
TEC 201-113-4552-E/A, Establishing a Net.
TEC 201-113-4553-E/A, Authentication.
TEC 201-113-4554-E/A, Opening a Net.
TEC 201-113-4555-E/A, Free and Directed Net.
TEC 201-113-4556-E/A, Message Format, Part 1.
TEC 201-113-4557-E/A, Message Format, Part 2.
Army Correspondence Course SSO 470, The CEOI.
Army Correspondence Course SS9 735, Operation of Radio Set AN/PRC-77 (SOJT).

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PERFORM OPERATOR MAINTENANCE ON RADIO SET AN/VRC-46, AN/VRC-47, OR AN/VRC-12 WITH INTERCOM SYSTEM

CONDITIONS

Given:

1. TM 11-5820-401-12.
2. TM 11-5820-401-10-2.
3. Sash brush.
4. TM 38-750.
5. Mild, soapy water.
6. Flat tip screwdriver.
7. A radio station within range.
8. Call signs.
9. A frequency.
10. A blank DA Form 2404.
11. Radio set AN/VRC-46 or AN/VRC-47 or AN/VRC-12.

STANDARDS

1. While performing before-operation maintenance on the AN/VRC-46, AN/VRC-47, or AN/VRC-12, you must detect all of the following discrepancies if present:

   a. Splits in antenna elements.
   b. Missing tip on antenna top.
   c. Improperly keyed cable connector pins to the antenna base receptacle.
   d. Unsecured ground strap.
   e. Unsecured safety wire from antenna element to base.
   f. Improperly mounted or dirty matching unit.
   g. Improperly mounted R-T and AUX receivers.
   h. Poor O-rings on audio connectors.
   i. Corrosion and dirt in audio-receptacles.
   j. Cracked CVC shell, missing or loose mike boom adjusting knob, bail-out connector and cord not separating smoothly, CVC liner has parts missing or torn.
   k. Improper operation of circuit breaker on MX-7778/GRC.
   l. Improper operation of battle override switch.
   m. Improper operation of outside control box call lamp.
   n. Improper operation of outside control box with telephone hook-up.

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STANDARDS (cont)

2. While performing during-operation maintenance on the AN/VRC-12, you must detect all of the following discrepancies if present:

   a. Tip cap not in place on antenna top section.
   b. Improper tie-down on antenna.
   c. Improper operation of receiver-transmitter (R-T) when on assigned frequency.
   d. Improper R-T operation with radio relay box.
   e. Improper operation of R-T with remote control box.
   f. Poor reception of AUX receiver operation.

3. While performing after-operation maintenance on the AN/VRC-46, AN/VRC-47, or AN/VRC-12, you must detect all of the following discrepancies if present:

   a. Tip cap not in place on the antenna top section.
   b. Improper tie-down of antenna.
   c. Any splits in antenna elements.

4. While performing weekly maintenance on the AN/VRC-46, AN/VRC-47 and AN/VRC-12, you must detect all of the following discrepancies if present:

   a. Splits in the antenna elements.
   b. Tip cap missing on antenna top section.
   c. Improper tie-down of antenna.
   d. Improperly keyed cable connector pins to the antenna base receptacle.
   e. Unsecured ground strap.
   f. Improper operation of pushbutton presets.
   g. Improper operation or R-T with remote control box.
   h. Improper AUX receiver operation.
   i. Corrosion of vehicle battery terminals.
   j. Cracked CVC helmet, mike boom adjusting knob missing or loose, bailout connector will not separate smoothly, CVC helmet lining parts missing or cloth torn.
   k. Improper operation of driver's control box.
   l. Improper operation of circuit breaker.
   m. Improper operation of battle override switch.
   n. Improper operation of outside call lamp on outside control box.
   o. Improper operation of outside control box.

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STANDARDS (cont)

5. While performing monthly maintenance on the AN/VRC-47, AN/VRC-46, or AN/VRC-12, you must detect all of the following discrepancies if present:

   a. Water trapped inside the mount.
   b. Dirty threads to antenna elements,
   c. O-ring requiring light coat of silicon compound.
   d. Corrosion in audio-receptacle.
   e. Corrosion of R-T tuner contact.
   f. You must also remove the R-T from its mount.

6. You will correct all faults and defeciencies you are authorized to correct. You will record all faults on DA Form 2404. You will report all uncorrected faults to your supervisor.

PERFORMANCE MEASURES

1. Perform before-operation checks and services [table 1, items 3, 4, 17, and 18 (RT-246 only); 21 (AUX receiver only); 31 and 33].

2. Perform during-operation checks and services [table 1, items 3, 4, 17, and 18 (RT-246 only); 21 (AUX receiver only); 31 and 33].

3. Perform after-operation checks and services (table 1, items 1, 3, and 4).

4. Perform weekly operation checks and services [table 1, items 1, 3 thru 5, and 6 (MX-6707 only); 7, 9, 10, 17, and 18 (RT-246 only); 21 AUX receiver only); 22 (wheel vehicles); 23 thru 30, 32, and 34 thru 38].

5. Perform monthly operation checks and services [table 1, 2, and 8 (MX-6707 only); 12, 14, 19, and 20].

6. Correct deficiencies noted during the checks and inspections in performance measures 1 thru 5 above, if they are authorized for operator correction.

7. Report all deficiencies to organizational maintenance on DA Form 2404.

8. Report all uncorrected faults and deficiencies to your supervisor.

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PERFORMANCE MEASURES (cont)

Table 1.

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						ANTENNA SYSTEMS
1.	✓		✓	✓		Check to see that elements are not split. Replace defective elements.
2.					✓	Clean and lubricate threads.
3.	✓	✓	✓	✓		Check to see that the tip cap is in place on the top section.
4..	✓	✓	✓	✓		Check to see that the tie-down assembly is adjusted to properly hold down the antenna. Proper positioning permits safe release if antenna hits something. WARNING: Do not transmit on the radio while handling the antenna. When pulling the antenna down, make sure the tip is above any pedestrian and that it will not swing beyond the side of the vehicle.
5.	✓			✓		Ensure that all cable connector pins are straight, and properly keyed in their antenna's base receptacle.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						ANTENNA SYSTEMS (cont)
6.	✓			✓		Check to see that ground strap is securely connected. (MX-6707/VRC ONLY.)
7.	✓			✓		Safety wire is securely installed between bottom of antenna element and base.
8.					✓	Drain all water trapped inside the mount.
9.	✓			✓		Check to see that it is securely bolted. Check for cracks caused by overtightening. Check for softening caused by painting or solvents or trichlorethane. Clean with water and rag only. WARNING: Do not use water under pressure, do not use trichloroethane, and do not paint.
10.	✓			✓		Before installing an AUX receiver or R-T on its mount, make sure that: a. Receptacle cover is removed and chain is not caught between guide pin and receptacle.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						ANTENNA SYSTEMS (Cont) b. Both mount guide pins are straight. c. Unused underside receptacles are covered. d. Grounding straps are securely connected between top tray and mount base. e. Air vent port area is free of obstructions. f. Safety wire is installed between mount clamps.
11.	✓					AUDIO ACCESSORIES Ensure audio connectors (hand mikes, CVC cords) have a good O-ring.
12.					✓	O-ring has a light coat of silicon compound. Use MIL-M-8660.
13.	✓					If used, moisture barriers are in place.
14.					✓	Check for corrosion. Clean with pencil eraser if necessary.

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PERFORMANCE MEASURES (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	Table 1 (cont)
15.		✓		✓		AUDIO ACCESSORIES (cont) With audio accessories connected to the front panel and R-T turned on and tuned to the assigned frequency: WARNING: Do not start vehicle while radio is on. Start vehicle before turning on the radio. "Key the radio" and talk to the distant radio station. During the transmission, you should hear: sidetone and the blower running. During reception, you should hear the distant station. Call light should light when the squelch knob is in both ON positions.
16.		✓		✓		With audio accessories connected to the RELAY box, communicate with the distant station. During transmission, you should hear sidetone and the blower running. During reception, you should hear the distant station. During a retransmission hook-up, both terminals should communicate through your radio set.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
17.		✓		✓		AUDIO ACCESSORIES (cont) With pushbuttons preset to assigned frequencies, established communications with a distant station on each pushbutton channel. Check out normal transmission, reception and SQUELCH operation on each pushbutton channel.
18.		✓		✓		With satisfactory pushbutton operation and REMOTE CONTROL BOX connected to the R-T, check out each setting of the PWR SW on REMOTE CONTROL BOX. Check out the CHAN SEL switch on the REMOTE CONTROL BOX for all 10 pushbutton channels. If REMOTE CONTROL BOXES are in tandem check out each SE and CONTROL indicator to enable one box to get control from the other.
19.					✓	To prevent corrosion build-up on the tuner contacts, turn the tuner knobs back and forth several times. If you have an AUX receiver, do the same to its tuner knob.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
20.					✓	AUDIO ACCESSORIES (cont) With help from organizational maintenance: a. Remove the R-T from its mount. WARNING: Make sure power to radio is turned OFF. b. Lay the R-T on one side. c. Remove the back and side panels from heat-exchanger. d. Carefully clean both the vanes and squirrel cage fins (a toothbrush is OK). e. After cleaning, replace panels and install R-T on its mount.
21.		✓		✓		With AUX receiver turned on and tuned to the assigned frequency, have the distant radio station transmit to you. During reception, you should hear the distant station.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						AUDIO ACCESSORIES (cont)
22.	✓			✓		Call light should light when the squelch knob is in both ON positions. Check to see that the: a. Battery terminals are not corroded. b. Radio power cable lugs are securely connected to the battery. c. Radio power cable leads are tagged.
23.	✓			✓		CVC HELMET Cracked, rubber edging loose, rivets loose.
24.	✓			✓		Check for proper spring tension.
25.	✓			✓		Missing, cannot be tightened.
26.	✓			✓		Cord pinched, connectors separate smoothly.
27.	✓			✓		Bent, ball joint sticking or loose, frame or cord twisted.
28.	✓			✓		Check operation.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						CVC HELMET (cont)
29.	✓			✓		Missing, torn.
30.	✓			✓		Cloth torn. Foam or rubber parts hardened or missing. Note. Wash with warm water and suds and dry carefully. WARNING. Be careful not to wet the earphone-microphone set. MAIN JUNCTION BOX AMPLIFIER (AM-1780/VRC)
31.		✓				Check all controls and indicators for proper operation (including operation with an outside telephone; see Task Summary 113-600-2006, Place a Tank External Phone into Operation.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						DRIVER'S CONTROL BOX (C-2297/VRC)
32.	✓			✓		Check all controls and indicators for proper operation.
						COMMANDER'S AND CREWMEMBER'S CONTROL BOX (C-2298/VRC)
33.		✓				Check all controls for proper operation.
						SUPPRESSOR, ELECTRIC TRANSIENT (MX-7778/GRC)
34.	✓			✓		Check for smooth operation.
35.	✓			✓		With radio turned off, check for smooth operation.
36.	✓			✓		Check operation with equipment operating. WARNING: Do not break radio silence if it is in effect.
						OUTSIDE CONTROL BOX (C-2296/VRC)
37.	✓			✓		Check to see that the outside call lamp is securely in place.

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PERFORMANCE MEASURES (cont)

Table 1 (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						OUTSIDE CONTROL BOX (C-2296/VRC) (cont)
38.	✓			✓		Check operation to include operation with an outside telephone connected to the unit.

REFERENCES

TM 11-5820-401-10-2, Radio Sets, AN/VRC-12, AN/VRC-46, and AN/VRC-47.
TM 11-5820-401-12, Radio Sets, AN/VRC-12, AN/VRC-46, and AN/VRC-47.
TM 38-750, The Army Maintenance Management System (TAMMS).

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PERFORM OPERATOR MAINTENANCE ON RADIO SETS AN/VRC-64 (WITH INTERCOM SYSTEM), AN/PRC-77,AND AN/GRC-160 (WITH INTERCOM SYSTEM)

CONDITIONS

Given:

1. TM 11-5820-498-12.
2. TM 11-5820-667-12.
3. AN/VRC-64 (with intercom system), AN/GRC-160 (with intercom system), or AN/PRC-77.
4. Clean cloth.
5. Sash brush (soft).
6. TM 38-750.
7. A radio station within range.
8. Call signs and suffixes.
9. A frequency.
10. Flat tip screwdriver.
11. A blank DA Form 2404.

STANDARDS

1. You must inspect, detect, and correct all operator level deficiencies within 20 minutes. On the AN/VRC-64/160, you must inspect for:

    a. Unsecured antenna tip.
    b. Improperly tied down antenna.
    c. Unconnected ground strap between the matching unit and vehicle.
    d. Inoperative relay rotor in the matching unit.
    e. Unsecured "Bendix" connector assembly to vehicle power outlet.
    f. Unsecured mounting clamps on amplifier power supply and MT-1029/VRC.
    g. Unsecured and dirty audio-accessory cable connectors.
    h. Binding of any control knob or switch.
    i. Unsatisfactory operation of squelch.
    j. Intermittent communication.
    k. Inability to transmit or receive from any crew position while on ALL and A.
    l. Improper operation of vehicle intercom from any crew positions.

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STANDARDS (cont)

m. Inability to conduct radio and intercom communication from the external phone.
n. Incorrect operation of telephone hookup on AN/1780/VRC and C-2296/VRC.

2. You must inspect, detect, and correct <u>all operator level deficiencies</u> within 10 minutes. You must inspect the AN/PRC-77/160 for:

a. Any incompleteness of the equipment.
b. Dirt and moisture in channel windows and on equipment surfaces.
c. Looseness of control knobs, internal or external binding in the mechanical action of the control.
d. Leaking, corrosion, and swelling of battery.
e. Failure of channel dial to light when switch is held.
f. Failure to hear rushing noise when function switch is on ON and when no signal is being received.
g. Hearing a rushing noise when function switch is on SQUELCH.
h. Failure to receive or transmit loud and clear in 30 to 52 MC range and 53 to 75 MC range.
i. Fraying, cuts, kinks, or broken insulation of handset cord.
j. Loose fit, corrosion, or other damage of canvas items, and damage to gasket on battery box CY-2562/PRC-25.

3. You must record on DA Form 2404 all faults that you, as an operator, cannot correct. You will report all uncorrected faults to your team chief.

PERFORMANCE MEASURES

1. Perform before-operation maintenance following tables 1 and 2.

a. For AN/VRC-64 and AN/GRC-160, perform steps 1 thru 7 in table 1.
b. For AN/PRC-77, perform steps 1 thru 4 and 6 thru 8 in table 2.

2. Perform during-operation maintenance following tables 1 and 2.

a. For AN/VRC-64 and AN/GRC-160, perform steps 1, 2, and 8 thru 12 in table 1.
b. For AN/PRC-77, perform step 5 in table 2.

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PERFORMANCE MEASURES (cont)

3. Perform after-operation maintenance following tables 1 and 2.

   a. For AN/VRC-64 and AN/GRC-160, perform steps 1, 2, and 4 in table 1.
   b. For AN/PRC-77, perform steps 1, 2, 4, 6, and 8 in table 2.

4. Perform weekly operation maintenance following tables 1 and 2.

   a. For AN/VRC-64 and AN/GRC-160, perform steps 1 thru 12 in table 1.
   b. For AN/PRC-77, perform steps 1, 2, 3, and 5 in table 2.

5. Perform monthly operation maintenance following tables 1 and 2.

   a. For AN/VRC-64 and AN/GRC-160, perform step 7 in table 1.
   b. For AN/PRC-77, perform steps 6, 7, 8 in table 2.

6. Correct deficiencies noted during the checks and inspections in performance measures 1 thru 5 above, if they are within the operator's capability.

7. Report all deficiencies not within the operator's capability to repair to organizational maintenance on DA Form 2404.

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PERFORMANCE MEASURES (cont)

Table 1.

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	AN/VRC-64/160
1.	✓					Ensure antenna tip cap is secured to the top Antenna Element MT-1095/VRC.
2.		✓				Ensure the antenna, when tied down, will not endanger personnel (pedestrians) and will not swing beyond the side of the vehicle. It will be tied down using the inverted "V" method.
3.				✓		Ensure the ground strap is connected between the matching unit and the vehicle (MX-6707/VRC only). Check to see that the safety wire is in place.
4.				✓		Set amplifier power supply ANT-FREQ control to each position. At each position, the relay rotor on the antenna matching unit should be heard operating. On the MX-6707/VRC, switch S-1 should point to the same frequency band at the ANT-FREQ control.
5.				✓		Ensure the "Bendix" connector assembly is secured to the vehicle power outlet.

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PERFORMANCE MEASURES (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	Table 1 (cont)
						AN/VRC-64/160 (cont)
6.	✓					Check the mounting clamps on the amplifier power supply and on the MT-1029/VRC to ensure they are secure.
7.			✓			Audio accessory cable connector; e.g., CVC cord, handset. a. Ensure O-ring is in place and not loose. b. Check to see that the connector locks securely to the radio and/or crew member control box connector. c. Clean the connector five-pin contacts, using a pencil eraser.
8.		✓				Radio operation. a. Check to see that all switches and controls can be moved to all their positions. b. Ensure the volume control does not bind and there is no interruption of the signal as the control is rotated through its range. c. Check for satisfactory operation of squelch.

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PERFORMANCE MEASURES (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	Table 1 (cont)
						AN/VRC-46/160 (cont) d. Ensure the communication is not intermittent.
		✓				
9.		✓				Ensure radio communication can be received and transmitted from all crew member control boxes from positions ALL and A. If a vehicle has an AUX receiver it should be heard on ALL and C only.
10.		✓				Ensure that the vehicle intercom system (all crew member control boxes) operates correctly.
11.		✓				Check the External Phone C-2296/VRC for correct operation. Radio and intercom can be conducted.
12.		✓				Check the operation of the telephone hook-up through the AN/1280/VRC and C-2296/VRC.

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PERFORMANCE MEASURES (cont)

Table 2.

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	
						AN/PRC-77 and AN/GRC-160
1.	✓					Check to see that the equipment is complete.
2.			✓			Remove dust, dirt, and moisture from channel window and equipment surfaces.
3.	✓	✓	✓			Controls: a. Check all controls for looseness and other damages. b. Check to see that the mechanical action of each control is smooth, and free from external and internal binding.
4.	✓		✓			Inspect battery for leakage, corrosion, and swelling. WARNING: Remove battery when radio set is not to be used for one or more days.
5.	✓			✓		Check operation of receiver transmitter: a. Set volume control to 5.

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PERFORMANCE MEASURES (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	Table 2 (cont)
						AN/PRC-77 and AN/GRC-160 (cont) b. Set and hold function switch to lite. Channel dial should light. c. Set function switch to ON. Rushing noise should be heard (when no signal is received). d. Set function switch to squelch. No rushing noise can be heard. e. Adjust RT-841/PRC-77 to receive test signals from nearby set operating in 30 to 52 MC range. Signals are heard loud and clear. f. Adjust RT-841/PRC-77 to channel in 30 to 52 MC range, and transmit test signal. The test signals should be heard loud and clear. g. Adjust RT-841/PRC-77 to channel in 53 and 75 MC range and transmit test signal. The test signals are heard loud and clear at nearby set.
6.					✓	Inspect handset cord for fraying, cuts, kinks, and broken installation.

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PERFORMANCE MEASURES (cont)

	BEFORE-OPERATION MAINT	DURING-OPERATION MAINT	AFTER-OPERATION MAINT	WEEKLY OPERATION MAINT	MONTHLY OPERATION MAINT	Table 2 (cont)
7.				✓		AN/PRC-77 and AN/GRC-160 (cont) Inspect all canvas items for damage, loose fit, and corrosion.
8.				✓		Inspect the gasket on battery box CY-2562/PRC-25 for damage.

		AN/PRC-77	AN/GRC-160	AN/VRC-64
RT-841	(Receiver-Transmitter)	1	1	1
AS-1729	(Antenna (Vehicular))		1	1
AT-892	(Antenna (3 ft whip))	1	1	
AT-271A	(Antenna 7 section, folding)	1	1	
AB-591	(Antenna Support)	1	1	
ST-138	(Harness (Back pack)	1	1	
CW-503	(Carrying Case)	1	1	
H-189	(Handset)	1	1	
OA-3633/GRC	(Power Amplifier)		1	1

Table 3. Component distribution.

REFERENCES

TM 11-5820-498-12 w/C 1 thru 7, Radio Sets AN/VRC-64 and AN/GRC-160.
TM 11-5820-667-12 w/C 1 thru 5, Radio Set AN/PRC-77.
TM 38-750, The Army Maintenance Management System (TAMMS).

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INSTALL TELEPHONE SET TA-312/PT

CONDITIONS

This task is performed in a tactical or nontactical environment under all weather conditions and may be performed in an NBC situation. Your supervisor will provide you with:

1. Telephone Set TA-312/PT.
2. Two each BA-30 Batteries.
3. Preinstalled Switchboard SB-22/P.
4. Preinstalled Cable WD-1/TT.
5. Tool Kit TE-33.
6. TM 11-5805-201-12.
7. FM 24-20.

STANDARDS

You must correctly install telephone set TA-312/PT in accordance with performance measures 1 thru 5 within 5 minutes.

PERFORMANCE MEASURES

1. Select site for TA-312/PT and prepare it for installation (refer to TM 11-5805-201-12, chap 2, para 2-3, pp 2-4 thru 2-8).
   a. Secure TA-312/PT to tree or pole, or position it on a desk.
   b. Remove the cover from the telephone set.
2. Install cable to the telephone set (refer to TM 11-5805-201-12, chap 2, para 2-3, pp 2-4 thru 2-8).
   a. Remove insulation from the cable.
   b. Connect cable to the binding post on the TA-312/PT.

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PERFORMANCE MEASURES (cont)

c. Secure cable to the object on which the telephone set is sited.

3. Prepare the telephone for operation.

a. Set the SELECTOR switch for type of operation desired (refer to FM 24-20, chap 11, sec II, para 145, pp 233 thru 235).

b. Install two batteries BA-30 (refer to TM 11-5805-202-12, chap 2, para 2-3, pp 2-4 thru 2-8).

c. Install the deicing screen (refer to TM 11-5805-201-12, chap 2, para 2-3, pp 2-4 thru 2-9).

d. Adjust the buzzer to proper ringing level (refer to TM 11-5805-201-12, chap 2, para 2-4, p 2-9).

e. Connect the headset to the telephone set (refer to TM 11-5805-201-12, chap 2, para 2-3, pp 2-4 thru 2-8).

4. Conduct an operational test (refer to TM 11-5805-201-12, chap 2, para 2-3, pp 2-4 thru 2-8).

a. Perform a ringing test.

b. Perform a transmission test (see Task Summary 113-571-1005, Send or Receive a Radiotelephone Message).

5. Submit a verbal completion report to your supervisor.

REFERENCES

TM 11-5805-201-12, Operator and Organizational Maintenance Manual, Including Repair Parts and Special Tools Lists: Telephone Set TA-312/PT, w/C 1 and 2.
FM 24-20, Field Wire and Field Cable Techniques.

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INSTALL AND OPERATE A FIELD TELEPHONE SET TA-1/PT

CONDITIONS

In a field environment, given an operational Telephone Set TA-1/PT, a set of TL-13A pliers, an installed WD-1/TT wire line, and a telephone switchboard with an operator at the distant end of the wire line.

STANDARDS

Within 5 minutes:

Complete a signal and communications check so that when the distant operator signals and transmits, the buzzer rings, the four white luminous markings snow on the visual indicator, the distant operator's voice can be heard in the receiver, you can be heard by the distant operator, and you can ring the distant operator.

PERFORMANCE MEASURES

1. Strip 1/4 inch of insulation from each conductor of the wire line.

2. Depress the spring-loaded line binding posts and insert one conductor into each post (fig 1). Release pressure on binding posts.

3. Adjust the buzzer volume control knob to LOUD.

4. Depress the generator lever to call the distant operator and ask for a buzzer signal.

5. When the buzzer sounds, rotate the buzzer volume control knob until the desired volume is obtained. Observe the visual indicator to see that it shows four white luminous markings.

6. While communicating with the distant operator, depress the press-to-talk switch when transmitting and release it when receiving (see Task Summary 113-571-1005, Send or Receive a Radiotelephone Message).

   Note. As a field expedient the receiver can be used for both transmitting and receiving.

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PERFORMANCE MEASURES (cont)

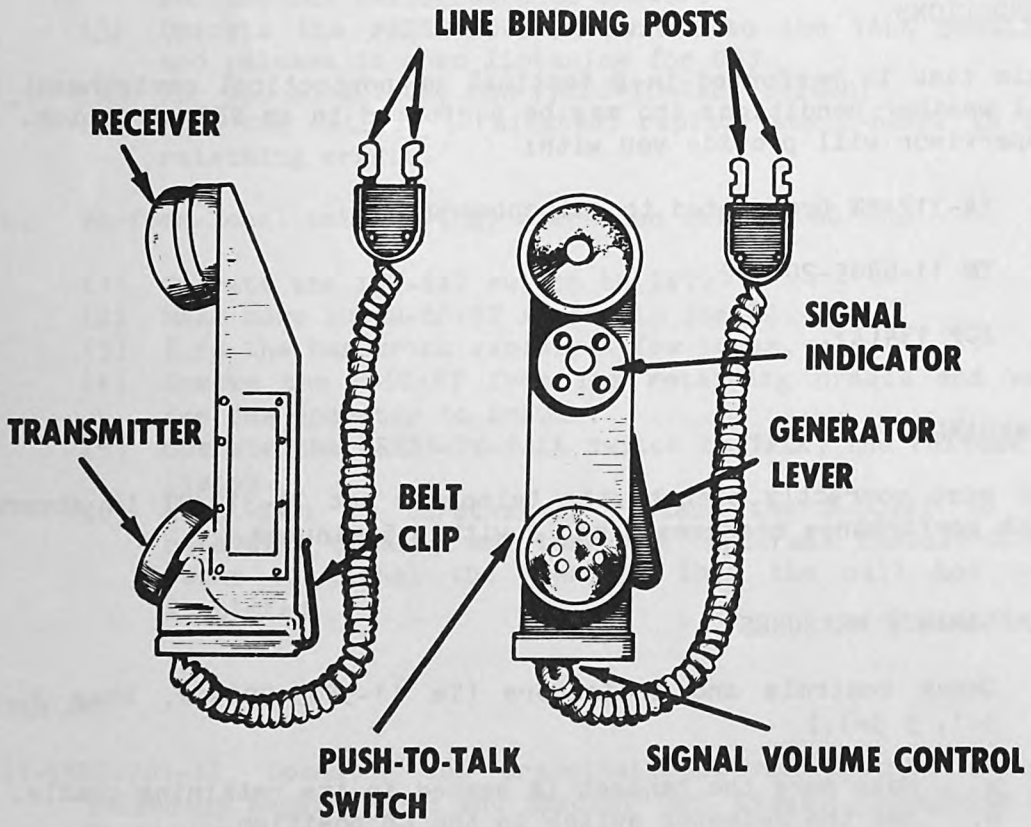

Figure 1.

REFERENCES

FM 24-18, Field Radio Techniques, app I, p 166.
TM 11-5805-243-12, Telephone Set TA-1/PT.
TEC 936-061-0137-A (to be published).

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OPERATE TELEPHONE SET TA-312/PT

CONDITIONS

This task is performed in a tactical or nontactical environment under all weather conditions and may be performed in an NBC situation. Your supervisor will provide you with:

1. TA-312/PT (connected to switchboard).
2. TM 11-5805-201-12.
3. ACP 134(A).

STANDARDS

You must correctly operate the telephone set TA-312/PT in accordance with performance measures 1 and 2 within 5 minutes.

PERFORMANCE MEASURES

1. Check controls and indicators (Tm 11-5805-201-12, chap 3, para 3-1, p 3-1.)

   a. Make sure the handset is seated in its retaining cradle.
   b. Set the selector switch to the LB position.
   c. Set the EXT-INT switch to the INT position.
   d. Set the LOUD-LOW control to the MID range.

2. Initiate a call (TM 11-5805-201-12, chap 3, para 3-2, p 3-2). (See Task Summary 113-571-1005, Send or Receive Radiotelephone Message.)

   CAUTION: Always perform the appropriate disconnect procedure when the call is terminated. If the proper procedure is not followed, the buzzer may not operate on the next incoming call.

   a. Perform common battery (CB) and common battery signalling (CBS) operation using H-60/PT.

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PERFORMANCE MEASURES (cont)

(1) Operate the INT-EXT switch to INT.
(2) Remove the H-60/PT from its retaining cradle, and wait for the the switchboard to answer.
(3) Operate the PRESS-TO-TALK switch to the TALK position and release it when listening for CBS.
(4) For CB, do NOT use the PRESS-TO-TALK switch.
(5) When the call is terminated, replace the H-60/PT in the retaining cradle.

b. Perform local battery (LB) operation using H-60/PT.

(1) Operate the INT-EXT switch to INT.
(2) Make sure the H-60/PT is firmly seated.
(3) Turn the handcrank rapidly a few turns.
(4) Remove the H-60/PT from its retaining cradle and wait for the operator to answer.
(5) Operate the PRESS-TO-TALK switch to TALK, and release to listen.
(6) When call is terminated, replace the H-60/PT in its retaining cradle, and turn the handcrank rapidly a few turns to signal the operator that the call has been completed.

REFERENCES

TM 11-5805-201-12, Operator and Organizational Maintenance Manual, Including Repair Parts and Special Tool Lists: Telephone Set TA-312/PT, w/C 1 and 2.
ACP 134(A), Telephone Switchboard Operating Procedure, w/C 1 thru 4.

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PLACE A TANK EXTERNAL PHONE INTO OPERATION

CONDITIONS

In a field environment, given a tank with intercommunications system in operation and a vehicle crewman in the driver's compartment with CVC.

STANDARDS

Within 3 minutes, transmit a message through the external telephone and receive an acknowledgement.

PERFORMANCE MEASURES

1. Open the storage box door and remove the external phone from the storage box.
2. Depress and release the push-to-talk switch on the side of the handset in order to signal the crew (fig 1).

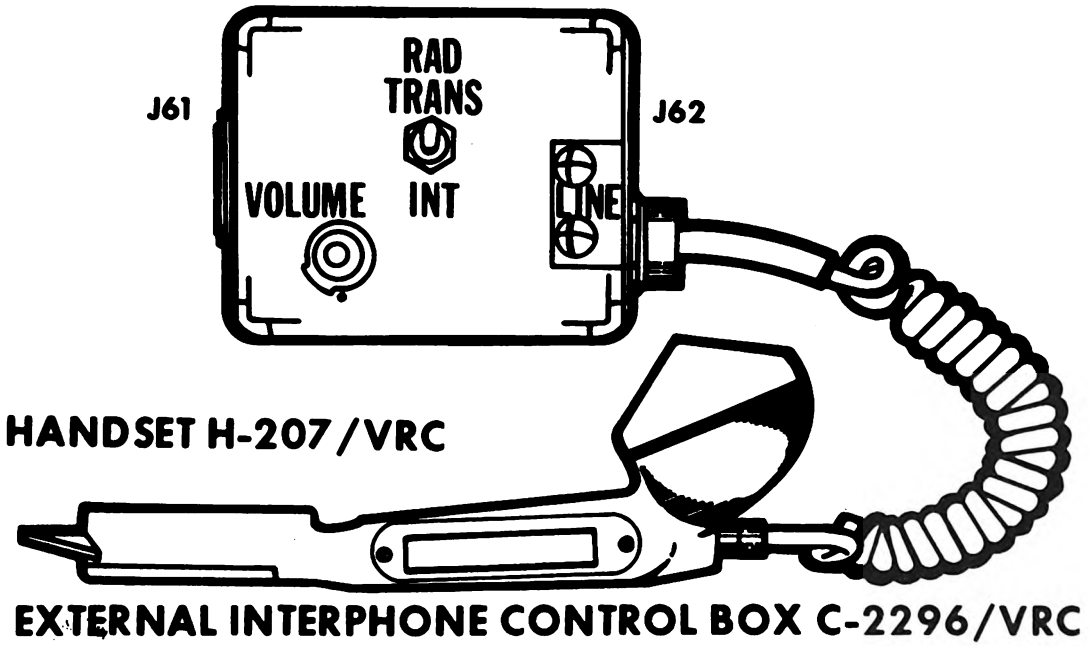

Figure 1.

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PERFORMANCE MEASURES (cont)

3. To talk to the vehicle crew member after the signal has been answered (see Task Summary 113-571-1005, Send or Receive a Radiotelephone Message).

   a. Press the push-to-talk switch and speak into the microphone.
   b. Release the push-to-talk switch to hear the reply.
   c. Adjust the volume control as desired while listening.

4. To transmit over the vehicle radio, hold the RAD TRANS INT switch in the RAD TRANS position while the push-to-talk switch is pressed.

5. To hear the reply, release the RAD TRANS switch and the press-to-talk switch.

6. Replace the telephone and close the door of the storage box.

REFERENCES

TM 11-5820-401-12, Operator's and Organizational Maintenance Manual w/C, para 3-20, p 3-29.

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PERFORM OPERATOR PREVENTIVE MAINTENANCE ON TELEPHONE SET TA-312/PT

CONDITIONS

This task is performed in a tactical or nontactical environment under all weather conditions and may be performed in an NBC situation. Your supervisor will provide you with

1. Telephone set TA-312/PT.
2. Hand tool TE-33 kit.
3. Cleaning cloth.
4. TM 11-5805-201-12.
5. TM 38-750.
6. Equipment Inspection and Maintenance Worksheet (DA Form 2404).

STANDARDS

Within 15 minutes, you must correctly perform operator's preventive maintenance on telephone set TA-312/PT in accordance with performance measure 1, and complete DA Form 2404 with no errors in accordance with performance measure 2.

PERFORMANCE MEASURES

1. Perform daily preventive maintenance checks and services (see TM 11-5805-201-12, chap 4, para 4-1 and 4-2, pp 4-1 thru 4-5.
   a. Check the telephone set for completeness (see fig 1 and TM 11-5805-201-12, app B, pp B-1 thru B-3).

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PERFORMANCE MEASURES (cont)

Note. The above checks and services will also be performed when the equipment is initially installed or reinstalled after removal for any reason, and at least once each week on equipment maintained in a standby condition.

2. Complete DA Form 2404 as a daily maintenance form (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records; and TM 38-750, chap 3, para 3-4, pp 3-4 thru 3-18).

   a. Record faults that you, as an operator, cannot correct (see TM 11-5805-201-12, chap 4, para 4-1 and 4-2, pp 4-1 and 4-5).

   b. Report all uncorrected faults to your supervisor.

REFERENCES

TM 11-5805-201-12, Operator and Organizational Maintenance Manual, Including Repair Parts and Special Tool Lists: Telephone Set TA-312/PT, w/c1 and 2.
TM 38-750, The Army Maintenance Management System (TAMMS), w/c1.

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PERFORM OPERATOR MAINTENANCE ON TELEPHONE SET TA-1

CONDITONS

Given:

1. Two TA-1 telephone sets.
2. DA Form 2404, Equipment Inspection and Maintenance Worksheet.
3. Field Wire WD-1/TT, 3 feet.
4. Tool Equipment TE-33.
5. Lint-free cloth.
6. Brush (hair sashbrush).
7. Cleaning compound.
8. TM 22-5805-243-12 w/C4.
9. TM 38-750.

STANDARDS

1. Within 15 minutes, you must detect all: unclean parts of the telephone set, any incompleteness of the telephone set, unserviceable handset cord, cracks in the carrying case, unserviceable rubber boot and press-to-talk switch, unserviceable rubber boot and generator lever, unserviceable buzzer volume control, faulty reception or transmission of the telephone set.

2. You must correct all faults that are within your capability.

3. You must record all faults on DA Form 2404 that you, as an operator, cannot correct. Report all uncorrected faults to your supervisor.

PERFORMANCE MEASURES

1. Perform operator's preventive maintenance on Telephone Set TA-1:

   a. Check the telephone set for completeness.
   b. Check the handset cord for serviceability.
   c. Check the carrying case for cracks and latch serviceability.
   d. Check the press-to-talk switch and rubber boot for serviceability.
   e. Check the generator lever and rubber boot for serviceability.
   f. Check the buzzer volume control for serviceability.
   g. Check for overall cleanliness.

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PERFORMANCE MEASURES (cont)

h. Check reception and transmission of the telephone set.

2. Correct deficiencies noted during the checks and inspections in step 1 if they are within your capability.

3. Complete DA Form 2404 (see TM 38-750, chap 3, para 3-4, pp 3-7 thru 3-12.

a. Record faults that you, as an operator, cannot correct.
b. Report uncorrected faults to your supervisor.

REFERENCES

TM 11-5805-243-12 w/C4, Operator and Organizational Maintenance: Telephone Set TA-1/PT.
TM 38-750, The Army Maintenance Management System (TAMMS).

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INSTALL RADIO SET CONTROL GROUP AN/GRA-39

CONDITIONS

This task is performed under all weather conditions in a field or a garrison location. Your tank commander will provide you with Radio Set Control Group AN/GRA-39, TM 11-5820-477-12, an installed radio set AN/VRC-46, TM 11-5820-401-12, 1/4-mile field wire WD-1/TT on reel DR-8, required batteries, Handset H-189/GR, and Tool Equipment TE-33.

STANDARDS

This task has been performed correctly when, in 10 minutes, the AN/GRA-39 components have been properly set up for installation according to performance measures 1 and 2 of this task, and the AN/GRA-39 has been installed and is ready to be operated according to performance measures 1 thru 4 below.

PERFORMANCE MEASURES

1. Prepare the Local Control Unit C-2329/GRA-39 for installation (see TM 11-5820-477-12, chap 2, para 2-4, page 2-1).

    a. Refer to figures 1 and 2 for familiarization with operator controls.

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PERFORMANCE MEASURES (cont)

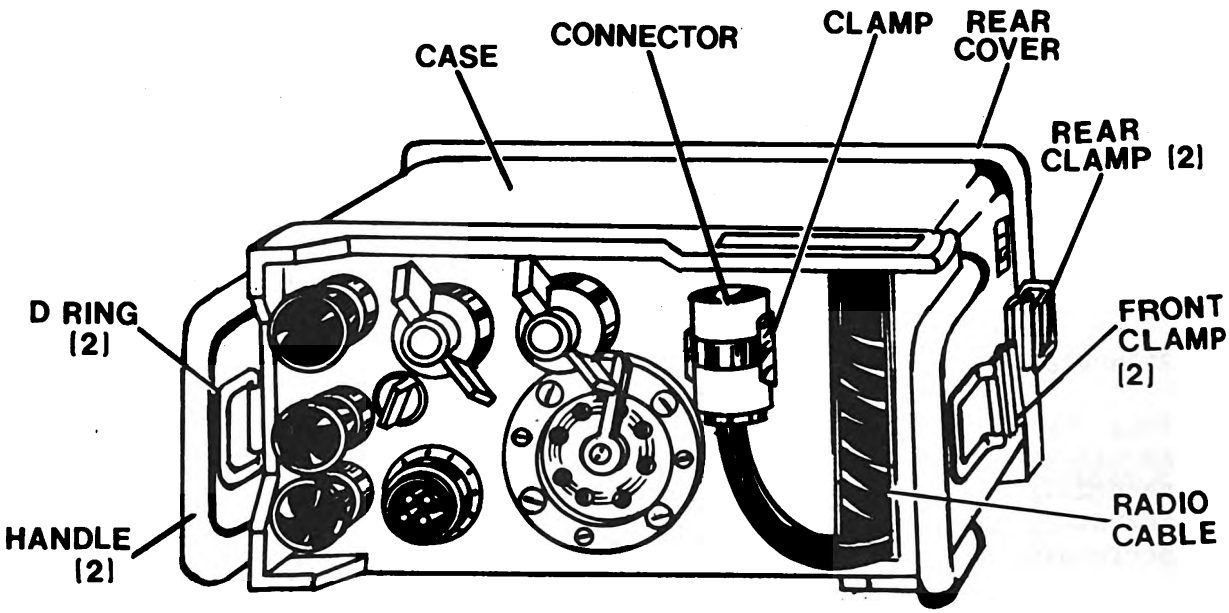

Figure 1. Local Control C-2329/GRA-39.

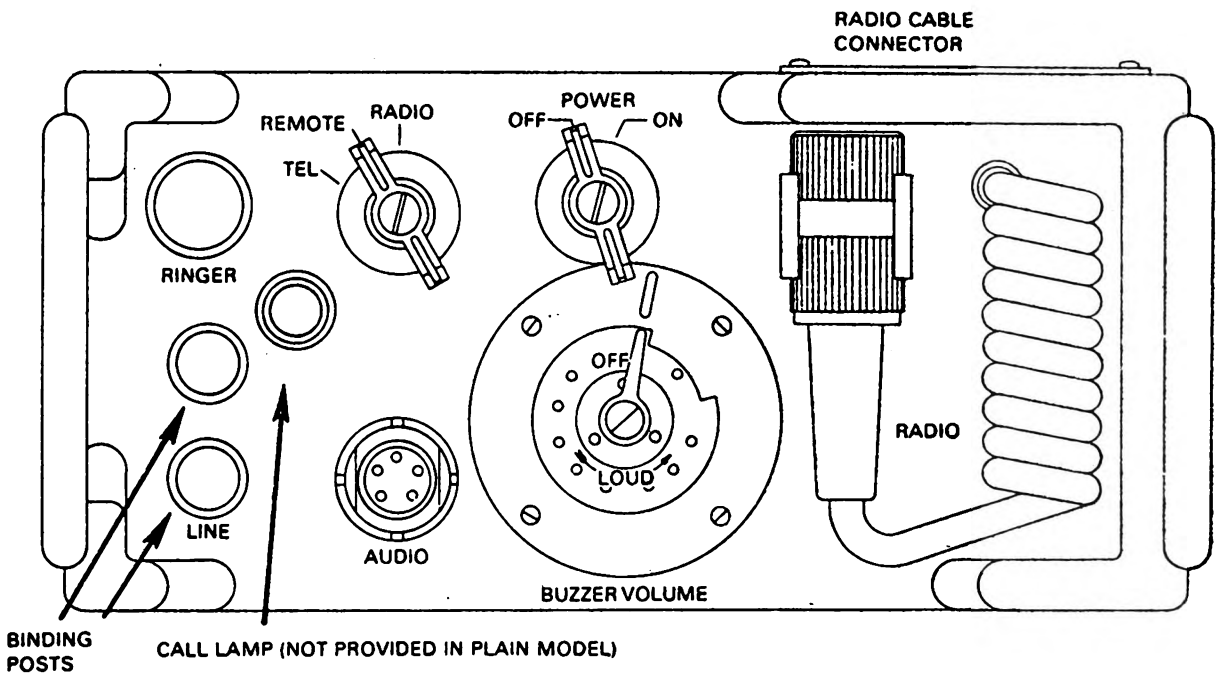

Figure 2. Local control unit, controls, indicator, and connectors.

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PERFORMANCE MEASURES (cont)

b. Unsnap the two rear cover clamps and remove the rear cover.

c. Inspect the battery compartment, and if needed, clean the compartment and battery contacts with a pencil eraser.

d. Install the batteries and make sure the battery terminals are in contact with the battery contacts.

(1) Make sure batteries are held in place under tension.

(2) Make sure the battery compartment case is not cracked.

e. Make sure all operating controls are free from internal or external binding.

2. Prepare Remote Control Unit C-2328/GRA-39 for installation (see TM 11-5820-477-12, chap 2, para 2-4, p 2-1).

a. Refer to figures 3 and 4 for familiarization with operator controls.

b. Unsnap the two rear cover clamps and remove the rear cover.

c. Inspect the battery compartment and perform the functions described for the local unit as needed.

d. Install the batteries, make sure there is proper contact with the terminals and that the batteries remain in the case under tension.

e. Replace the rear cover and snap the two clamps in place.

f. Make sure all operating controls are free from internal or external binding.

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PERFORMANCE MEASURES (cont)

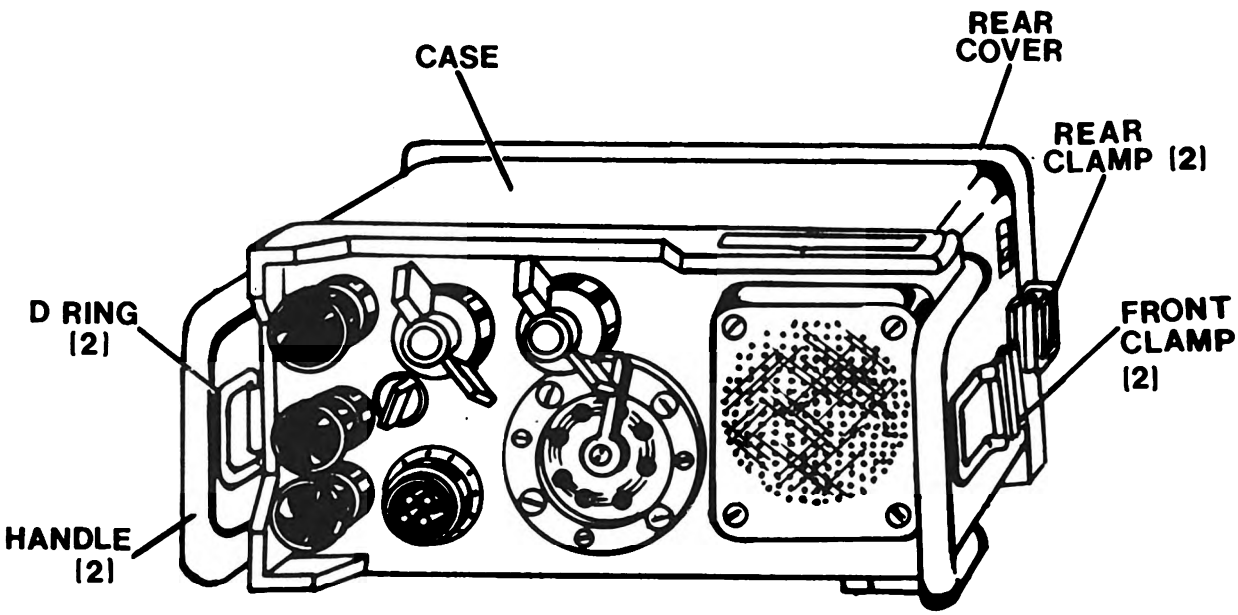

Figure 3. Remote Control Unit C-2328/GRA-39.

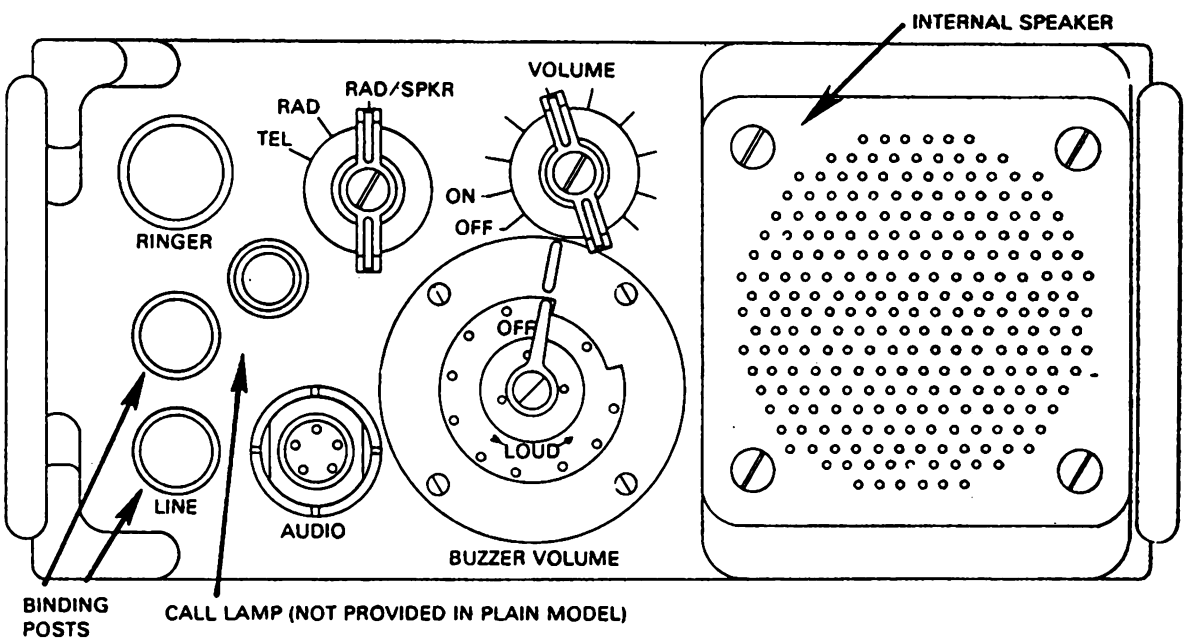

Figure 4. Remote control unit, controls, indicator, and connectors.

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PERFORMANCE MEASURES (cont)

3. Connect the Local Control Unit C-2329/GRA-39 to Radio Set AN/VRC-46 (see TM 11-5820-401-12, chap 6, sec II, para 608a, p 6-6).

   a. Locate the local control unit next to the radio and connect the local control unit radio cable to the RETRANSMIT R/W connector on the front of Radio Set AN/VRC-46.

   b. Attach Field Wire WD-1/TT to the binding posts of the local control unit.

      Note. Tie field wire to a solid object prior to connecting to the local control unit binding posts. This will prevent the local unit from being damaged should the wire be pulled by either man or vehicle.

   c. Lay field wire to the remote control site.

4. Connect Remote Control Unit C-2328/GRA-39 (see TM 11-5820-477-12, chap 2, para 2-5, fig 2-3, pp 2-1 thru 2-5).

   a. Tie field wire off to a solid object leaving sufficient wire to connect to the remote unit.

   b. Connect field wire to the binding posts of the remote control unit.

   c. Attach Handset H-189/GR to the AUDIO connector of the remote control unit.

REFERENCES

TM 11-5820-477-12, Operator's and Organizational Maintenance Manual, Radio Set Control Groups AN/GRA-39, AN/GRA-39A, and AN/GRA-39B.

TM 11-5820-401-12 w/C 1 thru 3, Operator's and Organizational Maintenance Manual, Including Repair Parts and Special Tool Lists for AN/VRC-12 Series Radio Sets.

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OPERATE RADIO SET CONTROL GROUP AN/GRA-39

CONDITIONS

This task is performed under all weather conditions in a field or garrison location. Your tank commander will provide you with an installed Radio Set AN/VRC-46, an installed Radio Set Control Group AN/GRA-39, TM 11-5820-477-12, a CEOI, a distant radio station with which to operate, and an assistant operator for the local control unit.

STANDARDS

This task has been performed correctly when, in 10 minutes, the AN/GRA-39 and the radio set have been aligned and started according to performance measures 1 thru 3 of this task, and the radio set control group has been placed into and taken out of telephone and radio communication according to performance measures 1 thru 6 below.

PERFORMANCE MEASURES

1. Make sure Radio Set Control Group AN/GRA-39 is properly installed (see TM 11-5820-477-12, chap 2, para 2-4 thru 2-5, figs 2-3 and 2-4, pp 2-1 thru 2-5).

2. Start the Local Control Unit C-2329/GRA-39 (see TM 11-5820-477-12, chap 3, sec II, para 3-3 p 3-3).

   a. Turn the POWER switch to ON.

   b. Set the BUZZER VOLUME control to approximately midrange.

3. Start the Remote Control Unit C-2328/GRA-39 (see TM 11-5820-477-12, chap 3, sec II, para 3-3, p 3-3).

   a. Turn the VOLUME control (ON/OFF switch) to approximately midrange.

   b. Set the BUZZER VOLUME control to approximately midrange.

4. Conduct a telephone communication check between local and remote control units. (see TM 11-5820-477-12, chap 3, sec II, para 3-4a, p 3-3).

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PERFORMANCE MEASURES (cont)

Note. During operation, adjust BUZZER VOLUME controls for desired level.

a. Press the RINGER button several times in quick succession to gain attention of other operator.

b. Set the remote control unit TEL-RAD-RAD/SPKR switch to TEL.

c. Turn and hold the local control unit TEL-REMOTE-RADIO switch to TEL.

d. Press the handset PUSH-TO-TALK switch to talk to the other operator; release to listen (see Task Summary 113-571-1005, Send or Receive a Radio Telephone Message).

5. Conduct a radio transmission and reception check from the remote control unit (see TM 11-5820-477-12, chap 3, sec II, para 3-4b, pp 3-3 and 3-4).

a. Have the operator at the local unit place TEL-REMOTE-RADIO switch of the local control unit to REMOTE position.

b. Have the local control unit operator adjust the radio volume control for a comfortable listening level at the local control unit handset to prevent excessive audio level (squeal) at the remote unit.

c. Set the TEL-RAD-RAD/SPKR switch of the remote control unit to RAD or RAD/SPKR.

d. Adjust the VOLUME control on the remote unit to desired listening level for either handset or speaker operation of remote unit.

e. Press the handset PUSH-TO-TALK switch to transmit; release to receive.

f. Use proper radio call signs and procedures to conduct radio check with distant station.

6. Conduct a radio transmission and reception check from the local control unit (see TM 11-5820-477-12, chap 3, sec II, para 3-4c, p 3-4).

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PERFORMANCE MEASURES (cont)

a. Turn and hold the TEL-REMOTE-RADIO switch of the local control unit to RADIO.

b. Press the handset PUSH-TO-TALK switch to transmit; release to receive.

c. Use the proper radio call signs and procedures to conduct radio check with distant station.

REFERENCES

TM 11-5820-477-12, Operator's and Organizational Maintenance Manual, Radio Set Control Groups AN/GRA-39, AN/GRA-39A, and AN/GRA-39B.
TC 24-3, Radio Wire Integration, Installation and Operation Tips.

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DETERMINE THE GRID COORDINATES OF A POINT ON A MILITARY MAP USING THE MILITARY GRID REFERENCE SYSTEM

CONDITIONS

Given a standard 1:50,000 scale military map, a 1:50,000 grid coordinate scale, a pencil and paper, and a point (such as Point A) on the map which is labeled for identification.

STANDARDS

Within 2 minutes, determine the six-digit grid coordinates for a point to within 100 meters (grid coordinates must be preceded by the correct two-letter 100,000-meter-square identifier).

PERFORMANCE MEASURES

To keep from getting lost you have to know how to find your location. There are no street addresses in a combat area, but the military map can spot your location accurately. It has black lines running up and down (north and south) and crosswise (east and west). They form small squares called grids. These lines are numbered along the outside edge of the map picture. Using these numbers you can name each square (fig 1). No two squares have the same number. To get the correct number for a certain grid square, first read from left to right along the bottom and find the line that borders your grid square on the left. Then read up and find the east-west line that borders your grid square along the bottom. Always read right, then up.

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PERFORMANCE MEASURES (cont)

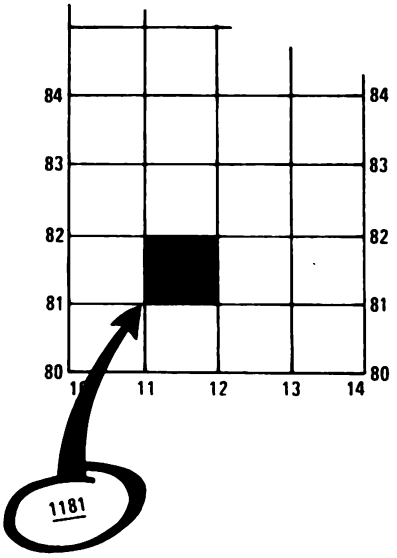


Figure 1.

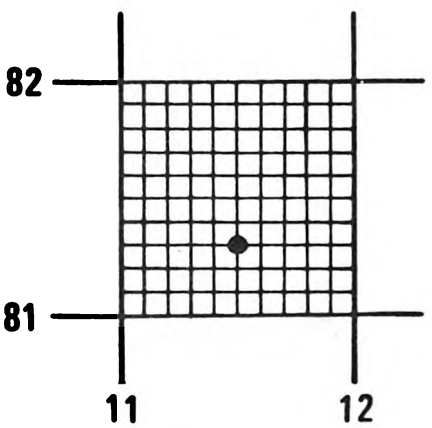
Look at figure 1. You know you are in the area shaded black on the map. Your "address" is grid square 1181. How do you know this? Start from the left and read <u>right</u> until you come to 11, the first half of your address. Then read <u>up</u> to 81, the last half. Your address is somewhere in grid square 1181.

Grid square 1181 gives your general neighborhood, but there is a lot of area inside that grid square. To make your address more accurate, just add another number to the first half and another to the last half--so your address has six numbers instead of four.

Here's how to get those extra numbers. Pretend that each grid square has ten lines inside it running north and south, and another 10 running east and west. This makes 100 smaller squares. You can estimate where these imaginary lines are.

<u>Note</u>. These six numbers are called coordinates; they give your location to within 100 meters.

Suppose you are halfway between line 11 and line 12. Then the extra number is 5 and the first half of your address is 115. Now suppose you are also 3/10 of the way between line 81 and line 82. Then the second half of your address is 813. (If you were exactly on line 81 the second part would be 810.) Figure 2 shows that if you were located where the dot is in grid square 1181, then your address would be 115813.



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PERFORMANCE MEASURES (cont)

If you have the device shown in figure 2, you don't have to worry about estimating exactly where you are inside a certain grid square. You don't have to use imaginary lines, because you can come up with your exact coordinates.

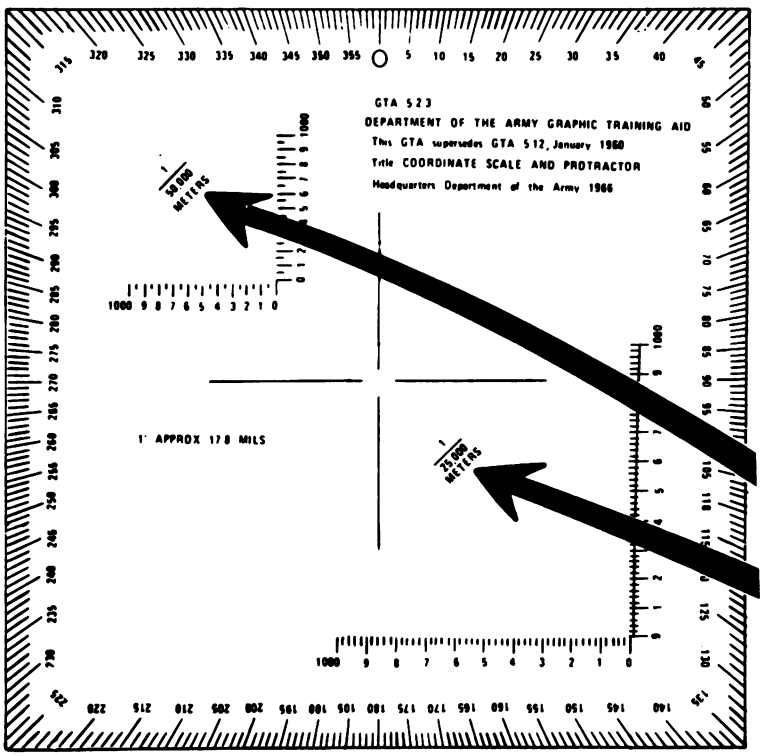
GTA 5 2 3
DEPARTMENT OF THE ARMY GRAPHIC TRAINING AID
This GTA supersedes GTA 5 12, January 1960
Title COORDINATE SCALE AND PROTRACTOR
Headquarters Department of the Army 1966
1 APPROX 17 8 MILS

Figure 2.

This is a coordinate scale and protractor. It helps you measure small distances inside grid squares. You can also measure angles with it. The coordinate scale and protractor is nothing more than a square piece of clear thin plastic. It is usually called a "protractor" for short. Here's how to determine the six-digit grid coordinates of a point on a map using a protractor.

1. First locate the grid square in which the point is located (the point should already be plotted on the map; see fig 3).

2. The number of the vertical grid line on the left (west) side of the grid square is the first and second digits of the coordinate.

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PERFORMANCE MEASURES (cont)

3. The number of the horizontal grid line on the bottom (south) side of the grid square is the fourth and fifth digits of the coordinate.

4. To determine the third and sixth digits of the coordinate, place the grid coordinate scale on the bottom grid line of the grid square in which Point A is located.

5. Check to see that the zeros of the coordinate scale are in the lower lefthand (southwest) corner of the grid square.

6. Slide the coordinate scale to the right keeping the bottom of the scale on the bottom grid line until Point A is located under the vertical (righthand) scale (fig 4).

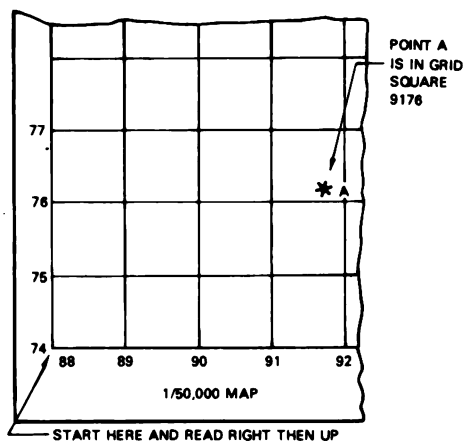

Figure 3.

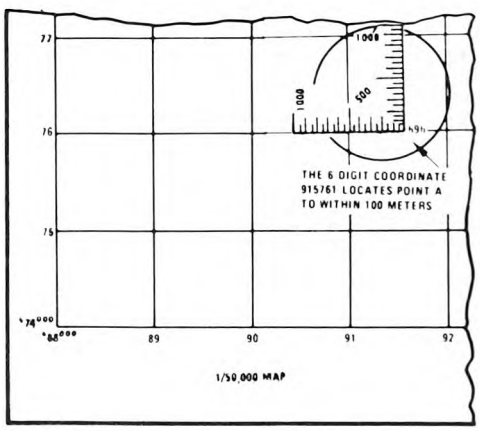

Figure 4.

7. The 100-meter mark on the bottom (horizontal) coordinate scale which is nearest the north-south gridline represented by the first and second digit of the coordinate to be determined is the third digit.

8. The 100-meter mark on the righthand (vertical) coordinate scale which is nearest Point A is the sixth digit.

9. Write the 6-digit coordinate on the paper provided.

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PERFORMANCE MEASURES (cont)

10. Determine the correct two-letter 100,000-meter-square identifier by looking at the grid reference box in the margin of the map.

11. Place the 100,000-meter-square identifier in front of the 6-digit coordinate.

    Note. As an alternate training method to improve map reading ability, start with a six-digit coordinate and plot the point on the map.

REFERENCES

FM 21-26, Map Reading, C1, chap 3, pp 3-8 thru 3-20, para 3-4 thru 3-7.
TC 21-26, Don't Get Lost, pp 5 thru 9.
TEC 930-071-0013-F, Introduction to Land Navigation.

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DETERMINE THE ELEVATION OF A POINT ON THE GROUND USING A MAP

CONDITIONS

Given a standard 1:50,000 scale military map, pencil, a designated point on the map, and a requirement to determine the elevation of that point.

STANDARDS

Within 1 minute, determine the elevation of the designated point to within 1/2 of the value of the contour interval.

PERFORMANCE MEASURES

To determine the elevation of a point on a map:

1. Locate the point on the map. (It may already be plotted on the map, or given as an eight-digit coordinate.)

2. Determine the contour interval of the map from the marginal information.

3. Locate the index contour line nearest the point for which the elevation is being sought.

4. Count the number of contour lines that must be crossed to go from the numbered lines to the point and note the direction--"up" or "down."

    a. If the point is on contour lines, its elevation is that of the contour.

    b. For points between contours:

        (1) Points less than one-fourth the distance between lines are considered to be the same as the elevation of the nearest line.

        (2) Points one-fourth to three-fourths the distance from the lower line are considered to be at an elevation half the contour interval above the lower line.

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PERFORMANCE MEASURES (cont)

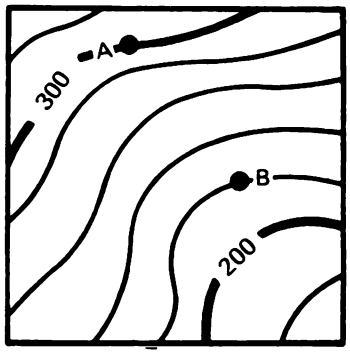

Figure 2.

You tell from the brown lines whether it's uphill or downhill. Every fifth line is heavier than the rest and has a number that gives its elevation (fig 2). Let's say that the contour interval is 20 feet again. You can tell that point "A" is 80 feet higher than point "B". Also, if you know the ground distance between "A" and "B", you can get an idea of how steep the slope is. Contour lines widely spaced show a gentle slope. When they are close together the slope is steep (see fig 3).

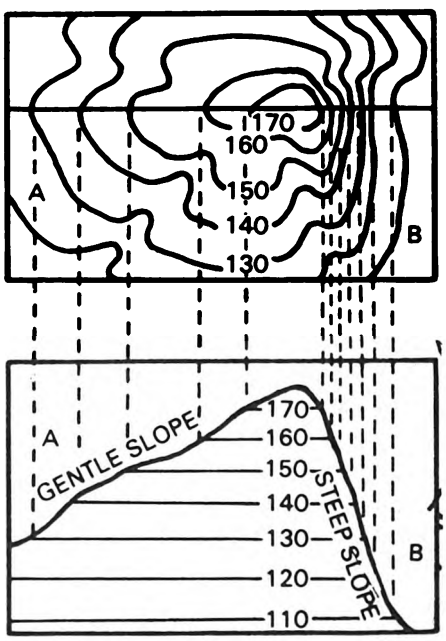

Figure 3.

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PERFORMANCE MEASURES (cont)

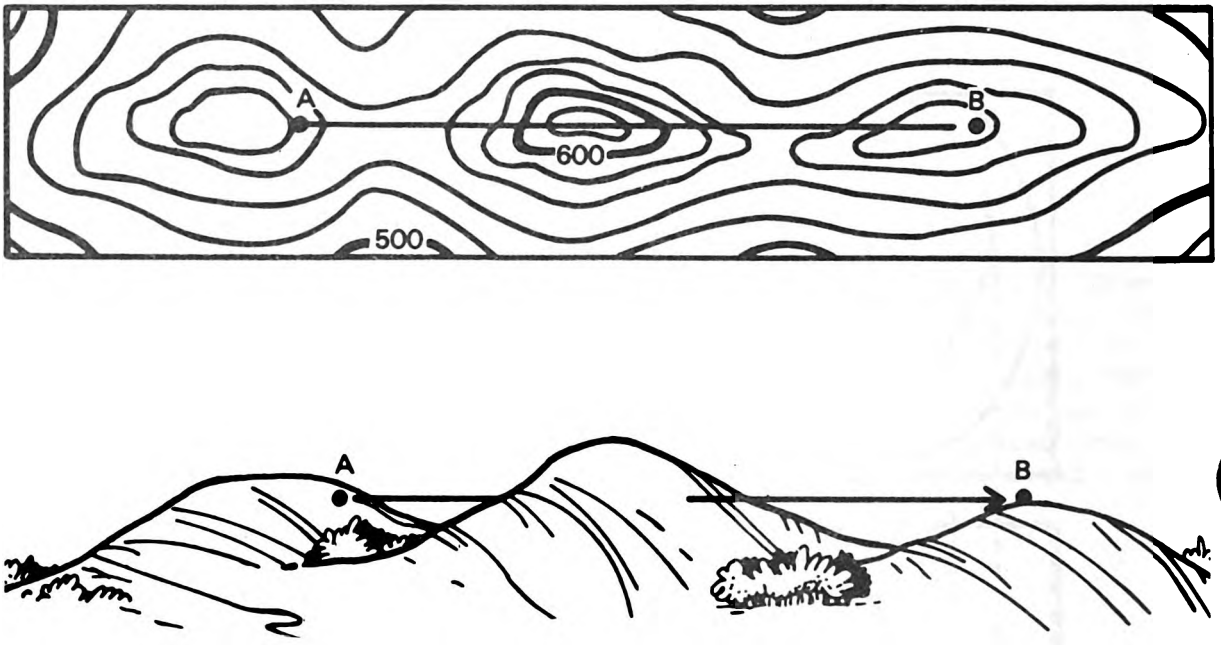

Figure 6.

Note. By combining the contour information you know about one hill with the contour information you know about the next hill, an accurate picture of what slopes, hills, and valleys look like on the ground can be determined from the map (fig 6).

REFERENCES

FM 21-26, Map Reading, C1 chap 6, p 6-1, para 6-2.
TC 21-26, Don't Get Lost, pp 42 thru 46.
TEC 930-071-0016-F, Terrain Features.

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NAVIGATE FROM ONE POSITION ON THE GROUND TO ANOTHER POINT

CONDITIONS

Given a standard 1:50,000 scale military map, compass, a coordinate scale and protractor, and designated start and finish points no more than 3,000 meters apart. The field location of the task should appear on the military map and contain varying types of terrain. Weather conditions should not be considered a limiting factor.

STANDARDS

Within 1 hour, move from the start point to the finish point.

PERFORMANCE MEASURES

1. Locate the start point and finish point on the map and determine where the start point is on the ground.
2. Determine the grid azimuth from the start point to the finish point on the map.
3. Convert the grid azimuth to a magnetic azimuth.
4. Determine the distance between the start point and the finish point on the map.
5. Convert the map distance to pace count.
6. Place the azimuth between the start point and the finish point under the fixed black index line of the compass.
7. When planning the route between points, select terrain features that will be encountered by making a map reconnaissance.
8. Make mental checklist of such features.
9. Move to the start point to begin pace count.
10. While moving along the route, check against your list.

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PERFORMANCE MEASURES (cont)

11. After reaching the finish point, conduct a detailed terrain analysis to confirm your location.

REFERENCES

FM 21-26, Map Reading w/C 1.
TC 21-26, Don't Get Lost, pp 42 thru 46.
TEC 930-071-0018-F, Land Navigating with Map and Compass.

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DETERMINE DISTANCE WHILE MOVING BETWEEN 2 POINTS ON THE GROUND

CONDITIONS

Given a 600-meter pace course, a pace factor conversion table to determine your pace count, and a requirement to move by foot over varying types of terrain during daylight hours, in all types of weather, from a start point to a finish point not less than 500 meters nor greater than 700 meters in length.

STANDARDS

Determine the distance between the start point and finish point to within 5% of the actual distance in a maximum of 45 minutes.

PERFORMANCE MEASURES

1. When you have to go a certain distance on foot without any landmarks to guide you, you can measure distance pretty accurately by counting your paces. The average pace is just a little less than one meter. The average man uses 116 paces to travel 100 meters. You should check your pace length by practicing on a known 100-meter distance--like a football field plus one end zone, which is 110 yards (close to 100 meters).

   CAUTION: When you travel cross country as you do in the field, you use more paces to travel 100 meters--usually about 148 instead of 116. This is because you are not traveling over level ground, and you must use more paces to make up for your movement up and down hills. You should pace yourself over at lease 600 meters of cross-country terrain in order to learn how many paces it takes you to travel an <u>average</u> 100 meters over cross country terrain.

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PERFORMANCE MEASURES (cont)

2. Be sure you know how many paces it takes you to walk 100 meters both on level terrain and cross country.

   Notes. 1. The big problem in pacing is maintaining a straight line. At night the average man tends to walk in a circle if he doesn't use a compass. In daylight, you should use aiming points and a compass. Also, remember to figure only the straight-line distance when you have to walk around an obstacle.

   2. Another problem is keeping count of paces taken. One way is to use pebbles. For instance, suppose you want to pace off one kilometer. (One kilometer is 1,000 meters, or the distance between two of the black grid lines on your map.) Put 10 pebbles in your right pocket. When you go 100 meters move one pebble to your left pocket and start your count over. When all 10 pebbles have been moved to the left pocket, you have traveled one kilometer. Or, you can tie knots in a string--one knot per 100 meters.

3. Now let's work a sample problem.

   Problem: You are to move 715 meters.

   a. Your pace count for 100 meters is equal to 116 paces.

   b. Using the pebble methods, you will need 7 pebbles. This will take you 700 meters. But what about the other 15 meters?

   c. To determine how many paces it will take to go the remaining 15 meters, you simply multiply 15 meters by your pace count (116).

      (1) 15 x 116 = 1740.

      (2) Mark out the last two numbers (40). The remainder is how many paces it will take to go 15 meters (17).

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PERFORMANCE MEASURES (cont)

d. You will go 715 meters using the pebble method by pacing off 116 paces per 100 meters until all 7 pebbles are used, then go an additional 17 paces to arrive at 715 meters.

Note. When determining your number of paces to go, if it is not a multiple of 100, always multiply the meters remaining by your pace count and mark out the last two numbers in your result.

REFERENCES

FM 21-26, Map Reading, C1.
TC 21-26, Don't Get Lost, pp 14 and 15.
TEC 930-071-0018-F, Navigating with Map and Compass.

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MEASURE DISTANCE ON A MAP

CONDITIONS

Given:

1. A standard 1:50,000 topographic map on which is plotted:

   a. Point A and Point B, 3,000 to 4,000 meters apart.

   b. Point C and Point D, 3,000 to 4,000 meters apart, on a road (trail) which changes direction at least twice.

2. A strip of paper with a straight edge.

STANDARDS

1. Determine the straight-line distance, in meters, from Point A to Point B within 50 meters, in 3 minutes.

2. Determine the road (curved-line) distance from Point C to Point D within 100 meters, in 3 minutes.

PERFORMANCE MEASURES

1. You can use your map to measure distance--how far it is between two places. The map is drawn to scale. This means that a certain distance on the map equals a certain distance on the earth. The scale is printed at the bottom and at the top of the map, like this--Scale 1:50,000.

2. This means that 1 inch on the map equals 50,000 inches on the ground. In fact, any ground distance equals 50,000 times that distance on the map.

   Note. Make sure you have located the meter scale on the particular map you are using. Military maps have different scales and you must use the meter scale to determine the proper distance between two points in meters.

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PERFORMANCE MEASURES (cont)

At the bottom of the map you will also find three different bar scales which will help you to change map distance to miles, meters, or yards. (fig 1).

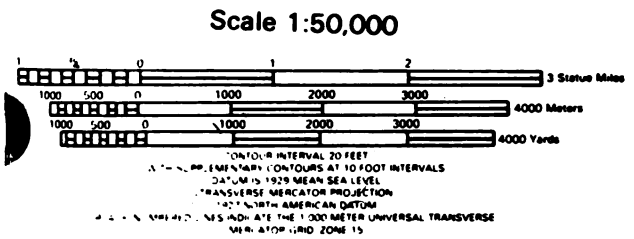

Figure 1.

Then put the ruler or paper just under one of the bar scales and read the ground distance in miles, meters, or yards. The bar scale in the picture shows a ground distance of 1,520 meters. (fig 3).

Take a ruler (straightedge) or the edge of a piece of paper and mark on it the straight line distance between your two points (fig 2).

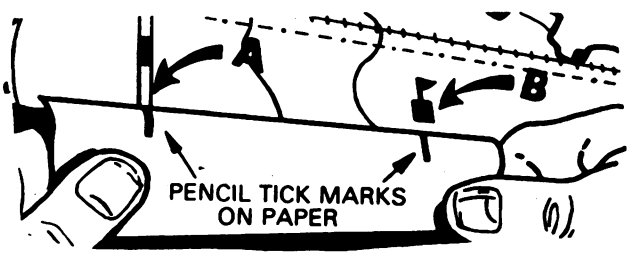

Figure 2.

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PERFORMANCE MEASURES (cont)

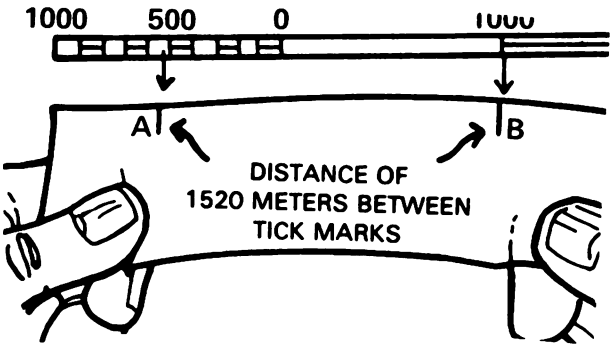

Figure 3.

Suppose you want to find the distance between A and B around a curve in a road (see fig 4). Take a strip of paper, make a small tick mark on it, and line up the tick mark with Point A. Align the paper with the road edge until you come to the curve, make another mark on the paper and on the map, and then pivot the paper so it continues to follow the road edge. Keep repeating this until you get to Point B. Always follow the road edge with your paper. Make a mark on your paper where it hits B, and then go to your bar scales to get the distance.

Normally, you will be required to measure distance in meters, and you may receive a problem that goes off the bar scale. The meter bar scale allows you to measure distances up to 5,000 meters. If you have to measure distances greater than 5,000 meters, follow these steps:

a. Place your starting point on the paper under the zero on the bar scale. Measure off 4,000 meters and place a new tick mark at that point on your paper.

b. Place this second tick mark also under the zero on the bar scale and determine if the distance on the paper now falls within the bar scale. If it does, add this value to 4,000 to give you your total distance. If it does not, repear step a until the distance on the paper falls within the bar scale. Remember to add this last value to the total number of meters you've already measured.

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PERFORMANCE MEASURES (cont)

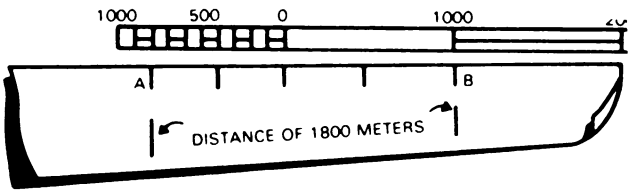

Figure 4.

Note. Mark map distance on a straightedge or a piece of paper. Then use the bars to get the ground distance.

FM 21-26, Map Reading, C1, chap 4, p 4-2, para 4-3.
TC 21-26, Don't Get Lost, pp 10 thru 13.

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ORIENT A MAP USING A COMPASS

CONDITIONS

Given a standard 1:50,000 scale military map and lensatic compass, in a field environment, under daylight conditions.

STANDARDS

Within 1 minute, orient the map to the ground using a compass so that the north-seeking arrow of the compass is within 3 degrees of the angle shown in the G-M angle of the declination diagram shown on the map.

PERFORMANCE MEASURES

1. With the map in a horizontal position, the compass is placed parallel to a north-south grid line with the cover side of the compass pointing toward the top of the map. This will place the black index line on the dial of the compass parallel to grid north. Since the needle on the compass points to magnetic north, we have a declination diagram on the face of the compass formed by the index line and the compass needle.

2. Rotate map and compass until the directions of the declination diagram formed by the black index line and the compass needle match the directions shown on the declination diagram printed on the margin of the map. The map is then oriented.

3. If the magnetic north arrow on the map is to the left of grid north, the compass reading will equal the G-M angle (given in the declination diagram). If the magnetic north is to the right of grid north, the compass reading will equal 360° minus the G-M angle.

4. Remember to point the compass north arrow in the same direction as the magnetic north arrow (2 above), and the compass reading (equal to the G-M angle or the 360° minus G-M angle) will be quite apparent.

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PERFORMANCE MEASURES (cont)

5. Some maps have a built-in protractor consisting of a pivot point "P" on the south neatline of the map and several degrees of arc along the north neatline of the map. The G-M line is obtained by connecting pivot point "P" with the appropriate value of the G-M angle (taken from the declination diagram) on the arc. The map may then be oriented by placing the compass parallel to this line and rotating the map and compass until the needle point is aligned with the continuous line formed by the index line and the sighting wire. The map is then oriented.

6. An alternate method is to draw a magnetic north line on the map from any N-S and E-W grid line intersection using the protractor. Align the straightedge of the compass along this magnetic north line and rotate the map and compass together until the north arrow falls beneath the fixed black index line on the compass.

   Note. If G-M angle is less than 3 degrees, do not line up north arrow.

REFERENCES

FM 21-26, Map Reading w/C 1, chap 5, p 5-10, para 5-7.

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ORIENT A MAP TO THE GROUND BY MAP-TERRAIN ASSOCIATION

CONDITIONS

Given a standard 1:50,000 scale military map in a field site, under daylight conditions.

STANDARDS

You must orient the map to north within 30° in 10 minutes.

PERFORMANCE MEASURES

There are many good ways that you can use to locate your position on your map, but first you have to do one important thing. Point your map so that NORTH, SOUTH, EAST, and WEST on the map point the same way as they do on the ground. This is called orienting your map.

Look at the map and the ground to find two linear features common to both, such as hilltops, saddles, valleys, ridges, and depressions. By aligning the features on the map with the same feature on the ground (figs 1 and 2), the map is oriented.

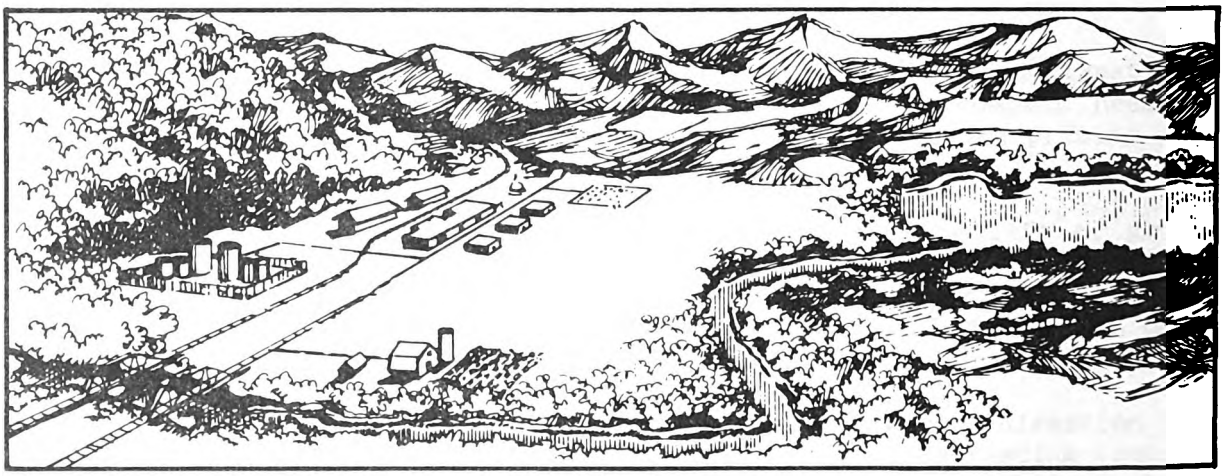

Figure 1. An area as viewed from a ground position.

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PERFORMANCE MEASURES (cont)

Note. Although natural terrain features are likely not to change and make good reference points to orient a map, you may also use man-made features such as roads, dams, buildings, bridges, etc., to orient your map.

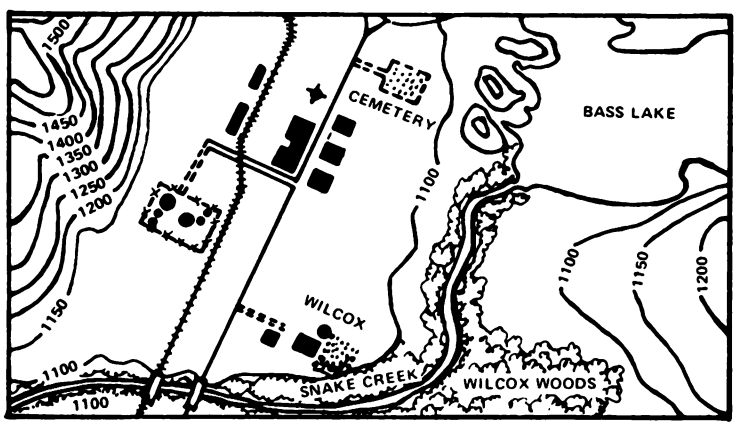

Figure 2. Map of the same area as in figure 1.

REFERENCES

FM 21-26, Map Reading, C1, chap 5, p 5-10, para 5-7.
TC 21-26, Dont't Get Lost.

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LOCATE AN UNKNOWN POINT ON A MAP OR ON THE GROUND BY INTERSECTION

CONDITIONS

In a field location, given a 1:50,000 map of the area, your location and the location of another known point, compass, coordinate scale and protractor, pencil, and an object or terrain feature for which you must determine the location (grid coordinates).

STANDARDS

Within 7 minutes (15 minutes, if you must measure azimuths), determine the 100,000-meter square identification letters and 6-digit grid coordinates to within 100m.

PERFORMANCE MEASURES

Note. Intersection is a method used to locate unknown points on a map by intersecting lines from two known points. For example, a magnetic azimuth from a known observation post (OP) to an unknown point is changed to a grid azimuth and drawn on the map. Another magnetic azimuth from another known OP location to the same unknown point is changed to a grid azimuth and drawn on the same map. The point where the two lines intersect on the map is the location of the distant point.

1. Map and compass method (fig 1).

   Note. Map is not to scale, and an easterly G-M angle of 10° is used.

   a. Determine the G-M angle of the map you are using.

   b. Locate and mark your position on the map.

   c. Measure the magnetic azimuth to the unknown point (22°). Change it to a grid azimuth. If it is a westerly G-M angle, subtract from the magnetic azimuth you found. If it is an easterly G-M angle, add to the magnetic azimuth you found. In the example, the G-M angle used was 10° easterly.

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PERFORMANCE MEASURES (cont)

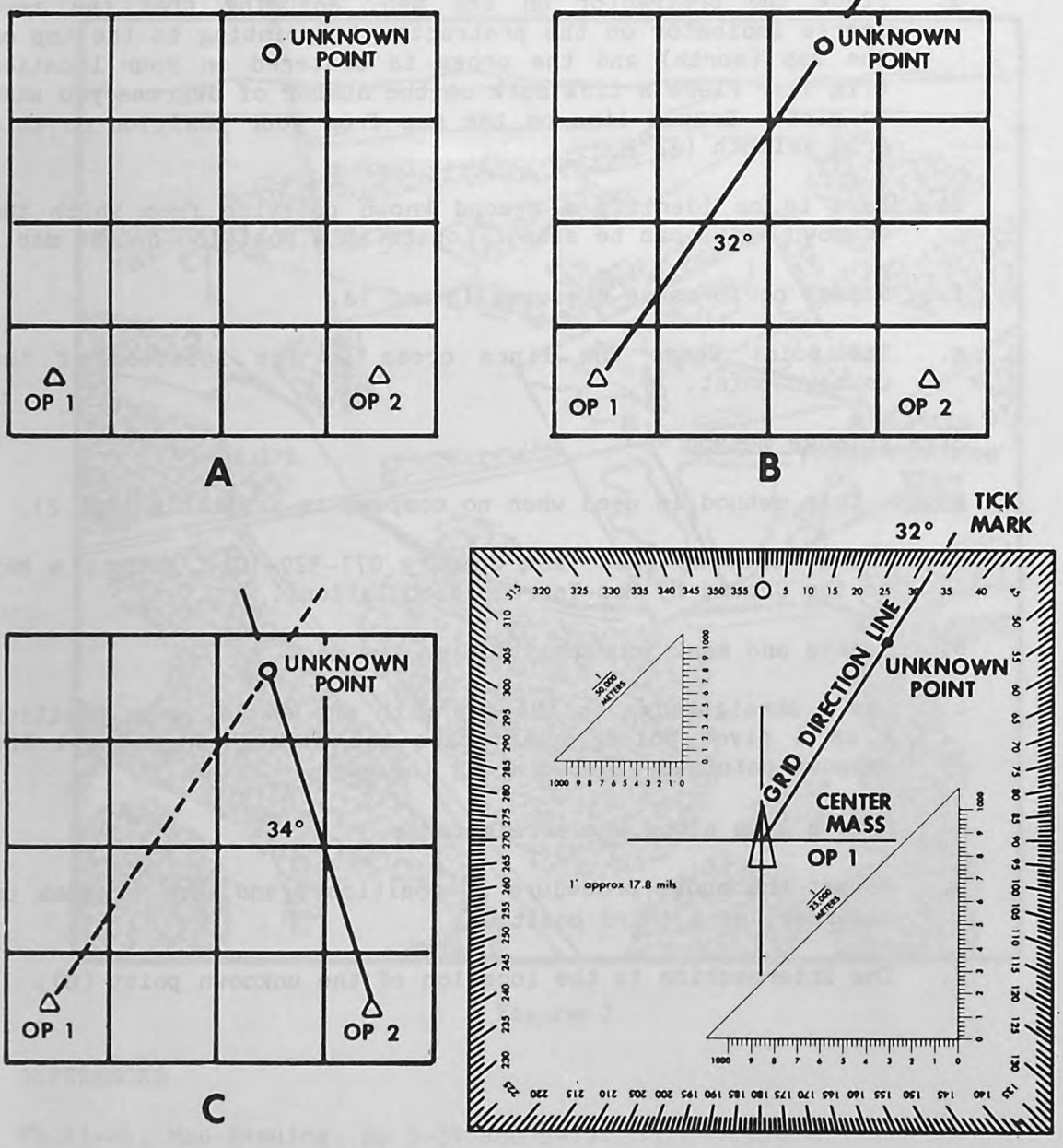

Figure 1.

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PERFORMANCE MEASURES (cont)

d. Place the protractor on the map, ensuring that the zero degree indicator on the protractor is pointing to the top of the map (north) and the cross is centered on your location (fig 1). Place a tick mark on the number of degrees you want to plot. Draw a line on the map from your position on this grid azimuth (32^{o}).

e. Move to or identify a second known position from which the unknown point can be seen. Locate this position on the map.

f. Repeat performance measures 1c and 1d.

g. The point where the lines cross is the location of the unknown point.

2. Straightedge method

Note. This method is used when no compass is available (fig 2).

a. Orient the map (see Task Summary 071-329-1012, Orient a Map to the Ground by Map-Terrain Association).

b. Locate and mark your position on the map.

c. Lay a straightedge on the map with one end at your position A as a pivot point, and rotate the straightedge until the unknown point is sighted along the edge.

d. Draw a line along the straightedge.

e. Repeat the above procedure at position B and, for a check on accuracy, at a third position.

f. The intersection is the location of the unknown point (C).

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PERFORMANCE MEASURES (cont)

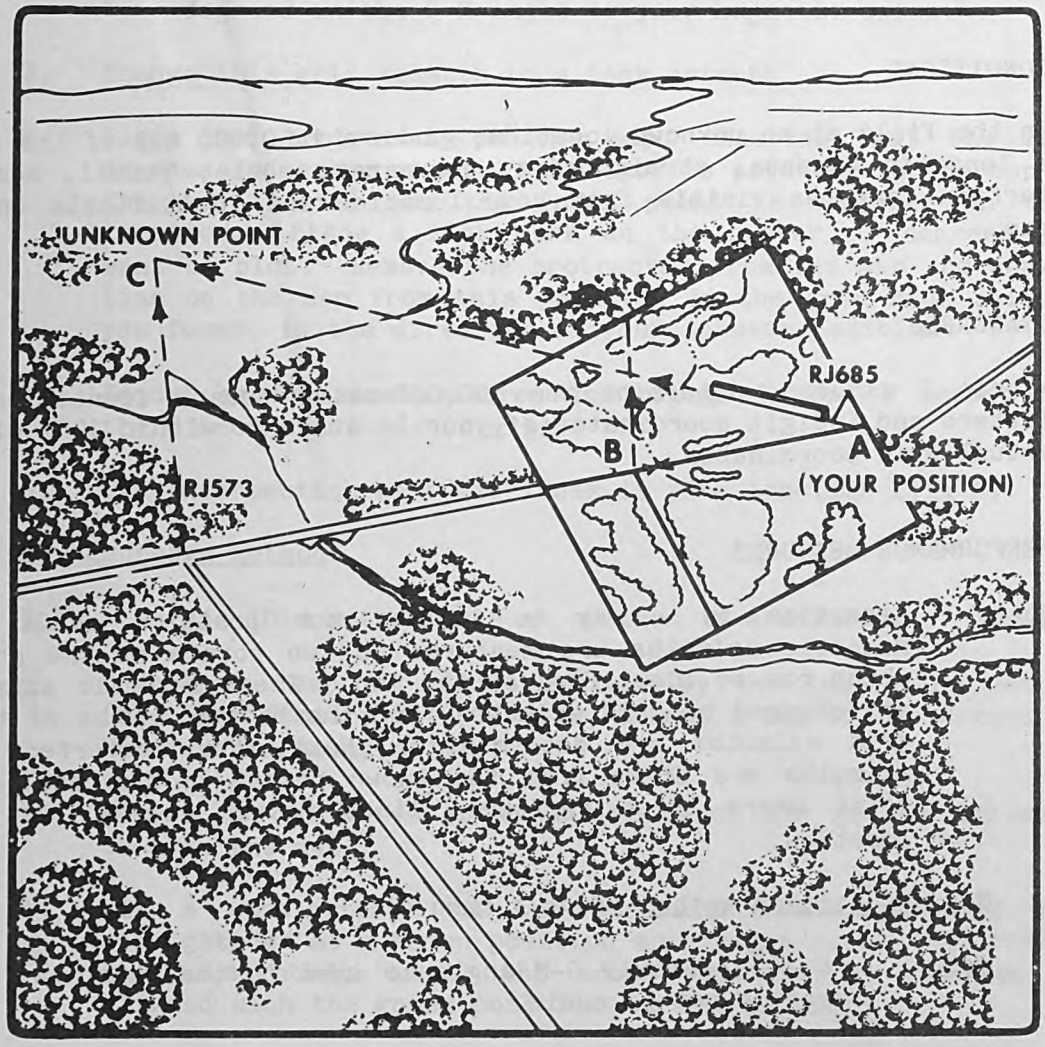

Figure 2.

REFERENCES

FM 21-26, Map Reading, pp 5-24 and 5-15.
TEC 030-071-0018-F, Navigating with Map and Compass.

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LOCATE AN UNKNOWN POINT ON A MAP OR ON THE GROUND BY RESECTION

CONDITIONS

In the field at an unknown location, given a 1:50,000 map of the area, a lensatic compass, straightedge, coordinate scale, pencil, and two terrain features visible from your location and identifiable on the map.

STANDARDS

Within 7 minutes, determine the 100,000-meter square identification letters and 6-digit coordinates of your location to within 100m of the actual grid coordinates.

PERFORMANCE MEASURES

Note. Resection is a way to locate your position on a map. Magnetic azimuths are measured to two points on the ground which can be identified on the map. These magnetic azimuths are changed to grid azimuths, and the back azimuths of these grid azimuths are determined. Next, the converted back azimuths are drawn from the known points on the map. The point where these two/three lines resect (cross) is your location.

1. Map and compass method (figs 1 thru 4).

   Note. A 10^{o} easterly G-M angle is used in the examples. The map is not to scale.

   a. Determine the G-M angle of the map you are using.

   b. Locate two known positions on the ground and mark them on your map (fig 1).

   c. Measure the magnetic azimuth to one of the known locations. Change this to a grid azimuth (fig 2).

      (1) If it is westerly G-M angle, subtract the number of degrees in the G-M angle from your magnetic azimuth.

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PERFORMANCE MEASURES (cont)

(2) If it is an easterly G-M angle, add the number of degrees in the G-M angle to your magnetic azimuth.

d. Change this grid azimuth to a back azimuth.

e. Place the protractor on the map, ensuring that the zero degrees indicator on the protractor is pointing to the top of the map (north) and the index point is centered on this location. Place a tick mark on the number of degrees you want to plot. Remove the protractor from the map and draw a line on the map from this position on the grid back azimuth you found, in the direction of your unknown position.

f. Repeat performance measures 1c through 1e for a second and third known position (fig 3).

g. The intersection of these lines is your location (fig 4).

2. Straightedge method.

Note. Use this method when no compass is available.

a. Orient the map on a flat surface by the inspection method (see Task Summary 071-329-1012, Orient a Map to the Ground by Map-Terrain Association).

b. Locate two or three known positions on the ground and mark them on the map.

c. Lay a straightedge on the map with the center of the straightedge at a known position as a pivot point, and rotate the straightedge until the known position on the map is aligned with the known positions on the ground.

d. Draw a line along the straightedge away from the known position on the ground toward your position.

e. Repeat performance measure 1c above, using a second known position.

f. The intersection of the lines is your location.

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PERFORMANCE MEASURES (cont)

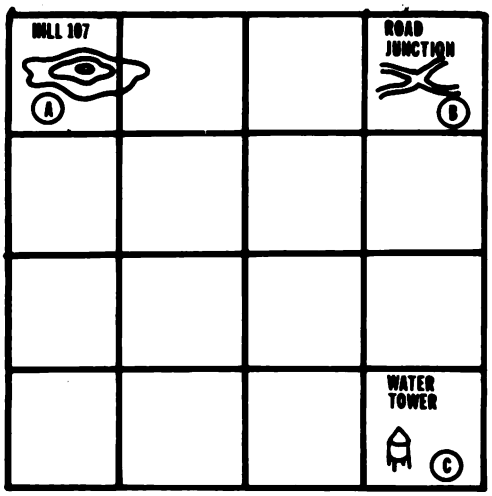

Figure 1.

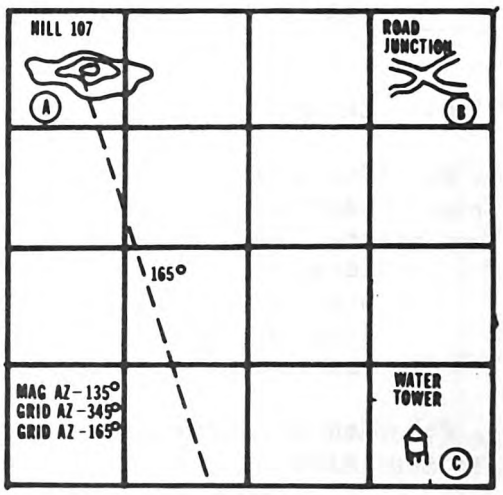

Figure 2.

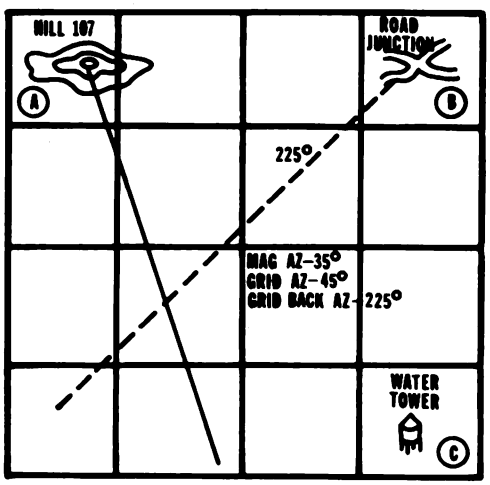

Figure 3.

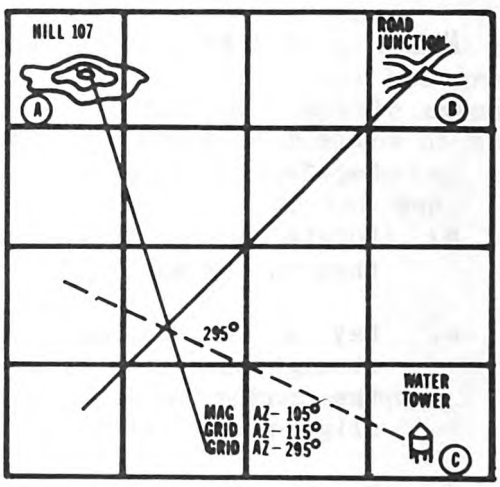

Figure 4.

REFERENCES

FM 21-26, Map Reading, pp 5-15 and 5-16.
TEC 930-071-0018-F, Navigating Using a Map and Compass.

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PERFORM OPERATOR'S MAINTENANCE ON AN M17 SERIES PROTECTIVE MASK

CONDITIONS

Given a dirty M17 series protective mask, carrier, accessories authorized to be stored in the carrier (per unit SOP), TM 3-4240-279-10, a pail of soapy water, a pail of clear rinse water, rags, and a small brush.

STANDARDS

1. All components and accessories authorized by unit SOP are present; any that are missing are reported to your supervisor.

2. All deficiencies not requiring higher echelon support have been corrected. Those which do require such support are reported to your supervisor.

3. Mask and carrier are free of dirt, sand, and grit.

PERFORMANCE MEASURES

1. Inspect mask and carrier.

    a. Remove the mask from the carrier and make sure all components are present (fig 1). Make sure accessories authorized by your unit SOP are present (fig 2). Inform your supervisor if any components or accessories are missing.

    b. Check the carrier for superficial dirt, mildew, rips, torn straps, and missing hardware.

    c. Check the facepiece for holes, tears, splits, and signs of deterioration of rubber parts.

    d. Check the filter elements to make sure that they are serviceable and properly installed.

    e. Check outserts for scratches, discoloration, or distortion that could affect vision.

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PERFORMANCE MEASURES (cont)

f. Check the head harness for dirt and mildew, worn, frayed, or broken straps, and missing clinch tips.

g. If present, check the hood for holes, rips, tears, or excessive wear. The hood is unserviceable if it has more than two pinholes in any one panel.

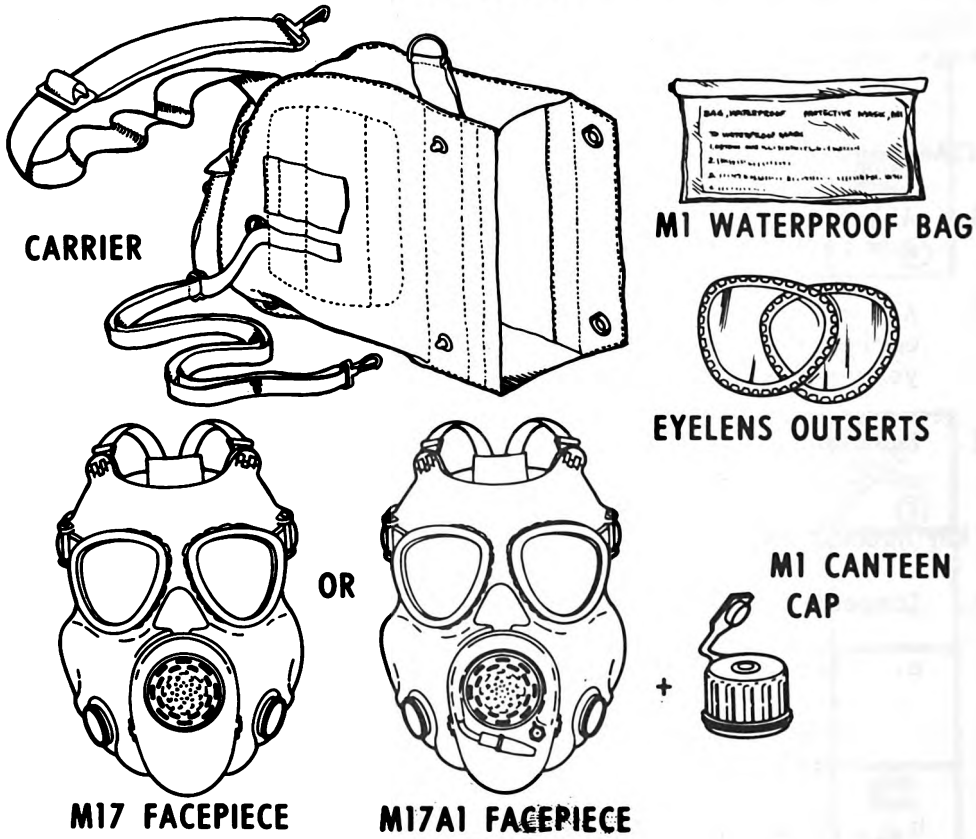

Figure 1.

h. Correct deficiencies which you are authorized to correct at your level (see TM 3-4240-279-10, sec III, pp 3-5 thru 3-12).

i. Notify your supervisor of any deficiencies which must be corrected at a higher level.

2. Clean the mask (without removing filter elements).

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PERFORMANCE MEASURES (cont)

f. If the nosecup valve disks become detached while the mask is being cleaned, reinstall them.

g. Reassemble the mask.

3. Clean the carrier.

a. Empty the carrier pockets.

b. Brush the carrier both inside and outside to remove sand or grit.

c. If the carrier is soiled, clean it with a brush dipped in clear, cold water.

d. Put components and authorized accessories back in the carrier.

REFERENCES

FM 21-40, NBC Defense, app B, pp B-4 thru B-6.
TM 3-4240-279-10, Mask, Chemical-Biological, Field, ABC-M17A1, M17, and Accessories, chap 3, pp 3-1 thru 3-14.
TEC 931-061-0065-A, NBC: Maintenance of the M17 Series Mask.

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RECOGNIZE AND PROTECT SELF AGAINST A CB HAZARD

CONDITIONS

Given all standard protective equipment and any one of the following indicators of a CB hazard:

1. Contamination markers (fig 1).

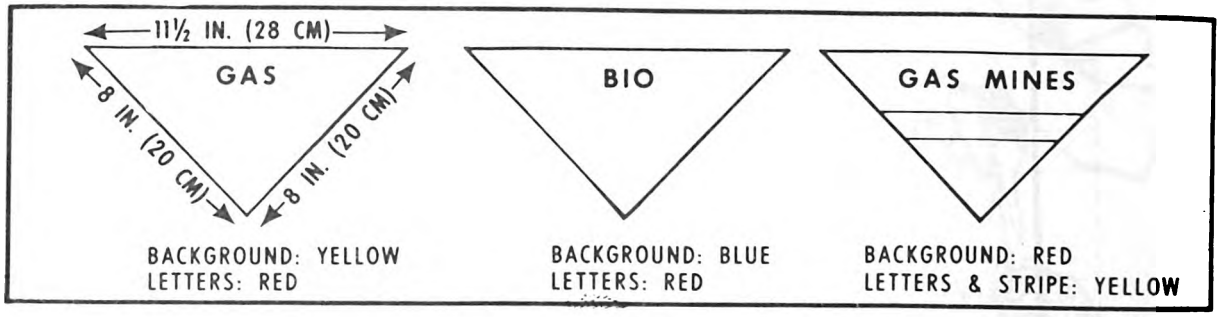

Figure 1.

Note. The front surface of the marker is facing away from the contaminated area.

2. Any artillery, mortar, rocket, or aircraft attack near your position.

3. Any smoke, mist, vapor, or droplets from an unknown source are in the area.

4. Explosions.

5. A standard alarm; e.g., a metal-on-metal (clanging) sound, a shout of "GAS" or "SPRAY," the automatic chemical agent alarm which sounds similar to a police siren.

6. Detection of a chemical or biological delivery method (fig 2).

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CONDITIONS (cont)

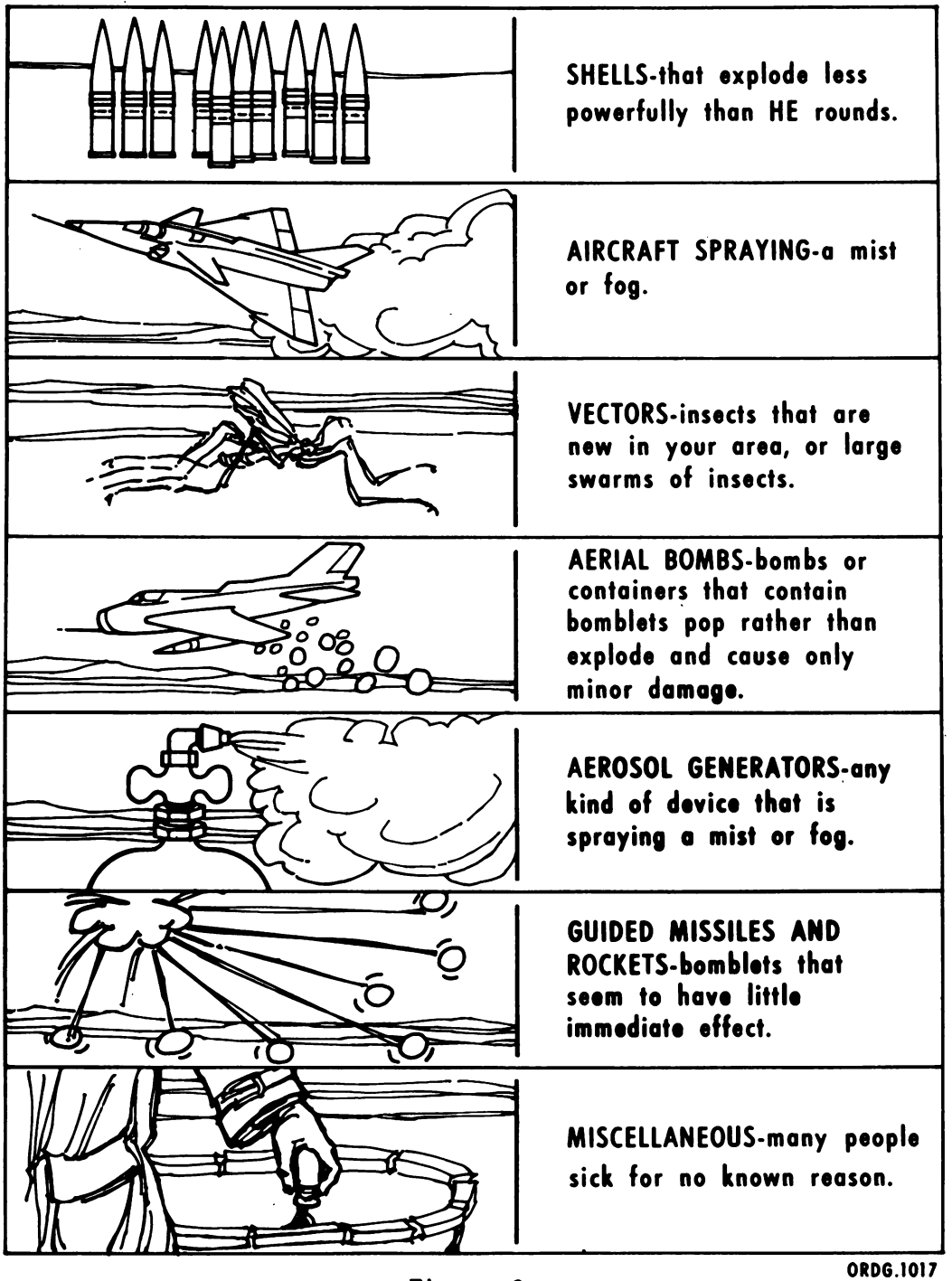
SHELLS-that explode less powerfully than HE rounds.
AIRCRAFT SPRAYING-a mist or fog.
VECTORS-insects that are new in your area, or large swarms of insects.
AERIAL BOMBS-bombs or containers that contain bomblets pop rather than explode and cause only minor damage.
AEROSOL GENERATORS-any kind of device that is spraying a mist or fog.
GUIDED MISSILES AND ROCKETS-bomblets that seem to have little immediate effect.
MISCELLANEOUS-many people sick for no known reason.
ORDG.1017

Figure 2.

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CONDITIONS (cont)

7. Any of the following symptoms appear:

   a. Running nose.

   b. Choking and/or tightness in the chest and throat.

   c. Dimming of vision or difficulty in focusing.

   d. Irritation of the eyes.

   e. Increase in breathing rate, and/or difficulty in breathing.

   f. Stinging sensation.

8. Any suspicious actions.

STANDARDS

1. Individual is protected by putting on the mask and securing openings in clothing.

2. All personnel are alerted to the danger.

PERFORMANCE MEASURES

1. Mask as described in Task Summary 031-503-1902, Put on and Wear a Protective Mask (M17-Series) or 031-503-1012, Put on and Wear an M24, M25, or M25A1 Protective Mask.

2. Secure all openings in your clothing.

3. Sound the alarm as described in Task Summary 031-503-1006, Give Visual, Vocal, and/or Sound Alarms for Chemical or Biological Attack.

4. If the mission permits, seek overhead cover.

REFERENCES

FM 21-40, NBC Defense, chap 1, pp 1-10 thru 1-18; chap 5, pp 5-2 and 5-3.
FM 21-41, Individual NBC Defense, PP 7, 8, 13 thru 17.

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SQT ADMINISTRATIVE INSTRUCTION

An on-target chemical agent attack can be simulated using the Simulator Projectile Airburst Liquid (SPAL) M9 or a spray of water combined with the detonation of artillery simulators.

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RECOGNIZE AND PROTECT SELF AGAINST A NUCLEAR HAZARD

CONDITIONS

Given a sudden, unwarned nuclear detonation, a warning that a nuclear attack is imminent, or the presence of a standard NATO radiological contamination marker.

STANDARDS

1. Immediately protect yourself from the initial effects by falling to the ground or,

2. Quickly take the best available cover or,

3. Recognize the marker and inform your supervisor.

PERFORMANCE MEASURES

1. When subjected to an unexpected nuclear attack:

   Note. A nuclear burst can be recognized by the great amount of heat, light, and blast produced and the mushroom-shaped cloud that forms following the explosion.

   a. Close your eyes and drop down inside an armored vehicle or fall face down to the ground immediately, your head in the opposite direction of the detonation.

      Note. If you have a choice between falling directly on the ground or taking two steps and jumping into a ditch, you must fall directly on the ground. In the time it takes to go these two extra steps, you can sustain serious injury.

   b. Cover all exposed portions of the skin (e.g., hands under your body, your face down, your shoulders forward to cover the back of your neck, and your helmet on).

   c. Remain down until the blast wave passes over you and the debris stops falling.

   d. Check for injury or damage to weapons and equipment.

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PERFORMANCE MEASURES (cont)

2. When warned of an imminent nuclear attack:

   a. Place yourself in best protective position possible (fig 1).

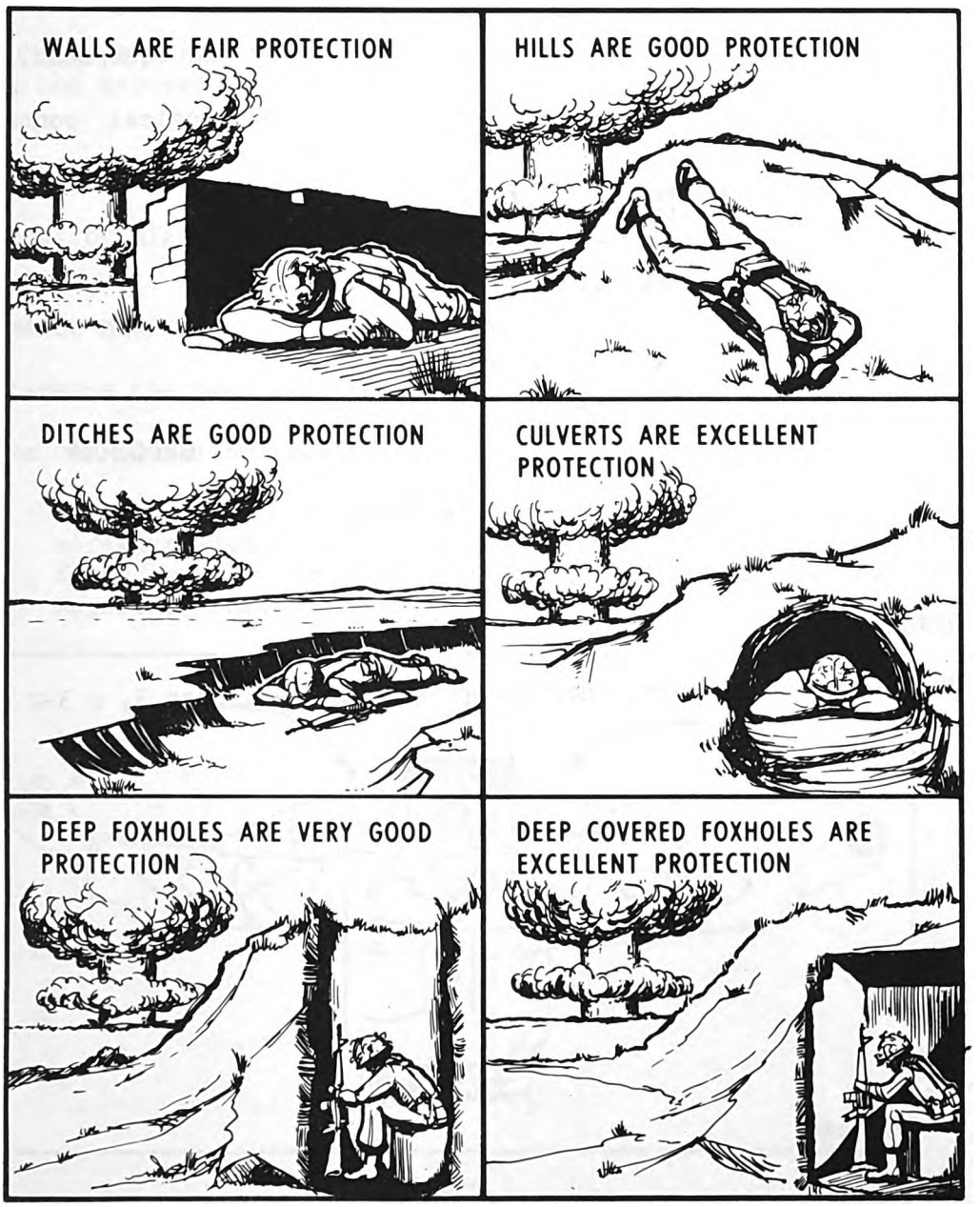
WALLS ARE FAIR PROTECTION
HILLS ARE GOOD PROTECTION
DITCHES ARE GOOD PROTECTION
CULVERTS ARE EXCELLENT PROTECTION
DEEP FOXHOLES ARE VERY GOOD PROTECTION
DEEP COVERED FOXHOLES ARE EXCELLENT PROTECTION
ORDG.1018

Figure 1.

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PERFORMANCE MEASURES (cont)

Note. An armored vehicle is excellent protection.

b. Remain in the shelter until the blast wave passes over you and the debris stops falling.

c. Check for injury or damage to weapons and equipment.

3. When you encounter a standard NATO radiological contamination marker (fig 2), notify your supervisor.

ORDG.1019

Figure 2.

REFERENCES

FM 21-40, NBC Defense, chap 2, pp 1-5 thru 1-7; chap 3, p 3-2.

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GIVE VISUAL, VOCAL, AND/OR SOUND ALARMS FOR CHEMICAL OR BIOLOGICAL ATTACK

CONDITIONS

In a field environment, wearing all individual combat equipment, masked, and exposed to a surprise chemical or biological attack.

STANDARDS

The signal or signals used are performed correctly.

PERFORMANCE MEASURES

1. Determine the most appropriate signal or signals to use.

2. Give the signal or signals.

   a. Visual signal (fig 1). Extend both arms horizontally sideways with fists doubled, facing up, and rapidly move the fists to the head and back to the horizontal position. Repeat at least 3 times.

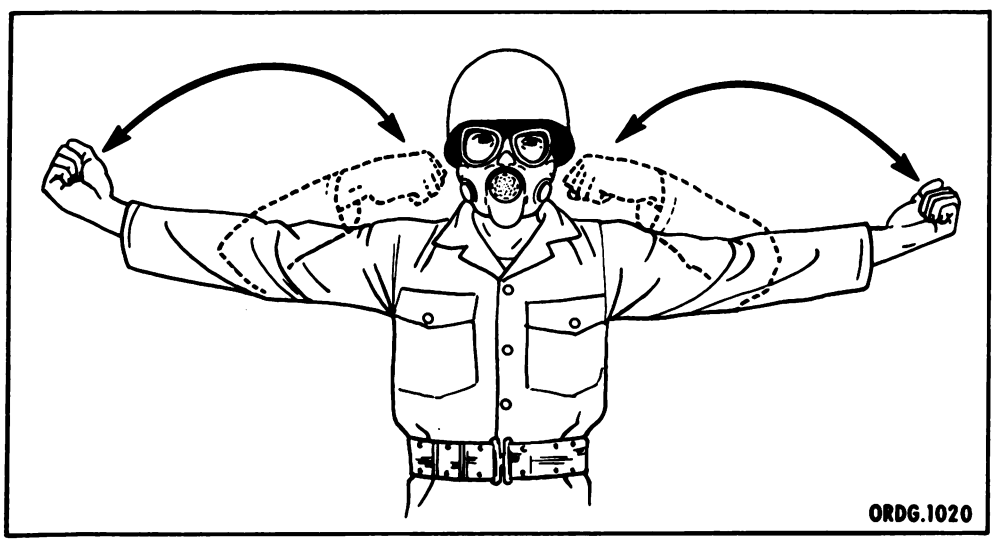

Figure 1.

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DECONTAMINATE SELF

CONDITIONS

Given all standard NBC protective equipment, the M13 and M258 decontamination kits, and contamination on the skin. (Contamination normally would result from exposure to a direct chemical attack or passage through a chemically contaminated area.)

STANDARDS

All contamination on the skin is properly removed.

PERFORMANCE MEASURES

1. If you are not already masked, mask according to Task Summary 031-503-1012 or 031-503-1902.
2. If the situation permits, seek cover.
3. For contamination on your face:
   a. Extract the M13 kit from your protective mask carrier.
   b. Take the fuller's earth pad (skin pad) from the M13 kit.
   c. Close your eyes, grasp the chin portion of your mask and pull the mask away from your face far enough to allow you to touch the fuller's earth pad to your nose.
   d. Make two quick wipes from your nose across the lower portion of your face to each ear and one wipe across the chin.
   e. Replace the mask on your face.
   f. Clear your mask.
   g. Check your mask.
   h. Dispose of the pad.
   i. If contamination was only on your face, put on all protective clothing not already on.

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PERFORMANCE MEASURES (cont)

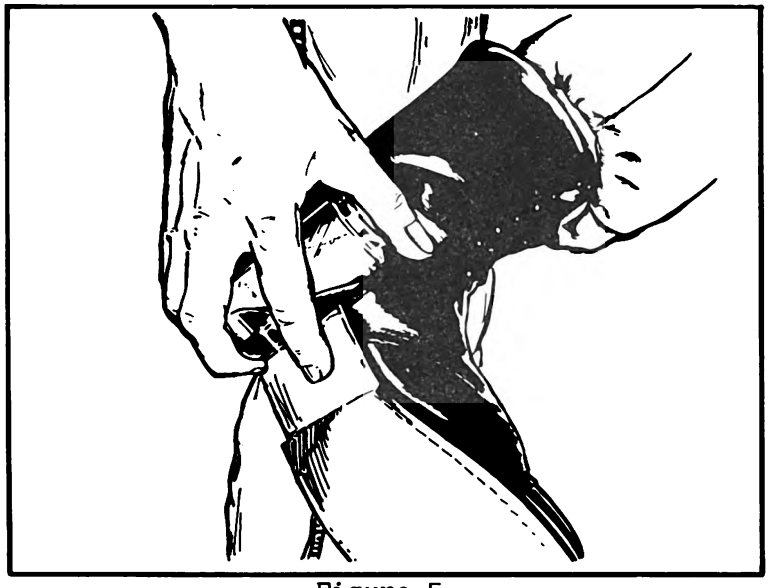

Figure 5. ORDG. 1026

h. Shake the capsule hard at least 12 times so that everything is well mixed.

i. Puncture capsule 2 the same way you did capsule 1.

j. Wet a gauze pad with the solution from the capsule, blot the contaminated area with the solution, and make sure you cover the entire contaminated area.

k. Dispose of the pad.

l. Put on all protective clothing not already on.

REFERENCES

FM 21-41, Individual NBC Defense, pp 58 thru 64.

SQT ADMINISTRATIVE INSTRUCTIONS

The M58 training kit will be used in all training situations. The M258 kit will be used only for actual chemical agents.

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DECONTAMINATE INDIVIDUAL EQUIPMENT

CONDITIONS

After being exposed to a chemical agent attack, passing through an area contaminated with an agent or operating in an area contaminated with a chemical agent, wearing all protective clothing, given an M13 individual decontamination and reimpregnating kit.

STANDARDS

Contamination is removed to the extent that the chemical agent detector kit will indicate a safe level.

PERFORMANCE MEASURES

1. Extract the M13 kit (fig 1) from the protective mask carrier.
2. Remove the fuller's earth pad and, if required, decontaminate the interior surface of your protective mask by:
   a. Blotting the contamination with one side of the pad.
   b. Turning the pad over.
   c. Slapping the pad against the mask to spread the powder.
   d. Rubbing the powder in, using the pad.
3. Remove the cloth bag and use it to decontaminate the exterior of the mask, clothing, and individual equipment by:
   a. Crushing dye capsule and mixing thoroughly inside the bag.

      Note. Do not crush the dye capsule unless actual contamination is present.

   b. Dusting the contaminated area.
   c. Inspecting clothing for red or brown color.
   d. Noting if red or brown color is present. If present, the cutter is used to remove spots larger than 1/8 inch.

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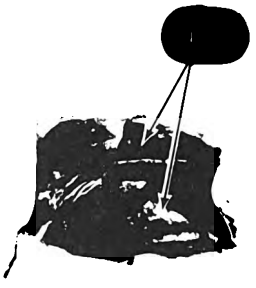
PERFORMANCE MEASURES (cont)

Note. This does not apply to the overgarment which has an inner liner of charcoal to neutralize the contamination.

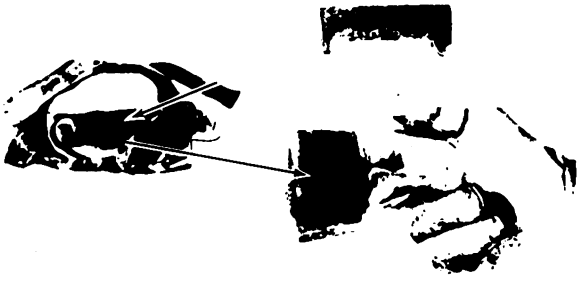
e. Rubbing the powder on equipment when using the bag.

f. Cleaning and oiling metal equipment.

KIT CONTAINER
WITH PLASTIC LID



TWO CLOTHING
DECONTAMINATING BAGS
WITH DYE CAPSULE INSIDE



SMALL DECONTAMINATING PAD AND CUTTER

Figure 1.

REFERENCES

FM 21-40, NBC Defense, app B, pp B-7 and B-9.
FM 21-41, Individual NBC Defense, pp 65 and 66.

SQT ADMINISTRATIVE INSTRUCTIONS

That portion of the procedure which requires crushing of the dye capsule will be simulated. Only in the event of an actual chemical contamination will the capsule be crushed.

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SATISFY PERSONAL NEEDS IN A CHEMICAL ENVIRONMENT

CONDITIONS

In a chemical environment, dressed in full chemical protective clothing and equipment, given the need to drink water, use the latrine, and sleep.

Note. Other personal needs such as eating, shaving, bathing, and changing clothes in a chemical environment require equipment and efforts beyond the capabilities of an individual. Your unit will tell you how to deal with these problems.

STANDARDS

Satisfy needs without becoming a casaulty.

PERFORMANCE MEASURES

1. Drink water.

   a. When equipped with M17A1 protective mask (see fig 1 and 2).

   b. When equipped with mask other than the M17A1.

      (1) Remove the canteen from the carrier, remove the canteen cap and, if necessary, decontaminate exposed threads with water or the skin pad from the M13 decontaminating kit.

      (2) Take a few breaths and hold the last one.

      (3) Close the eyes, pull the protective hood up, grasp facepiece behind the outlet valve assembly of the protective mask with the free hand, and pull the facepiece out and up far enough to provide access to the mouth.

      (4) Place the neck of the canteen to the closed lips and cant it, tilting the head back until the water reaches the lips, and then fill the mouth with water.

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PERFORMANCE MEASURES (cont)

(5) Replace the facepiece, swallow the water, and then clear the mask.

(6) Rest and then repeat as necessary.

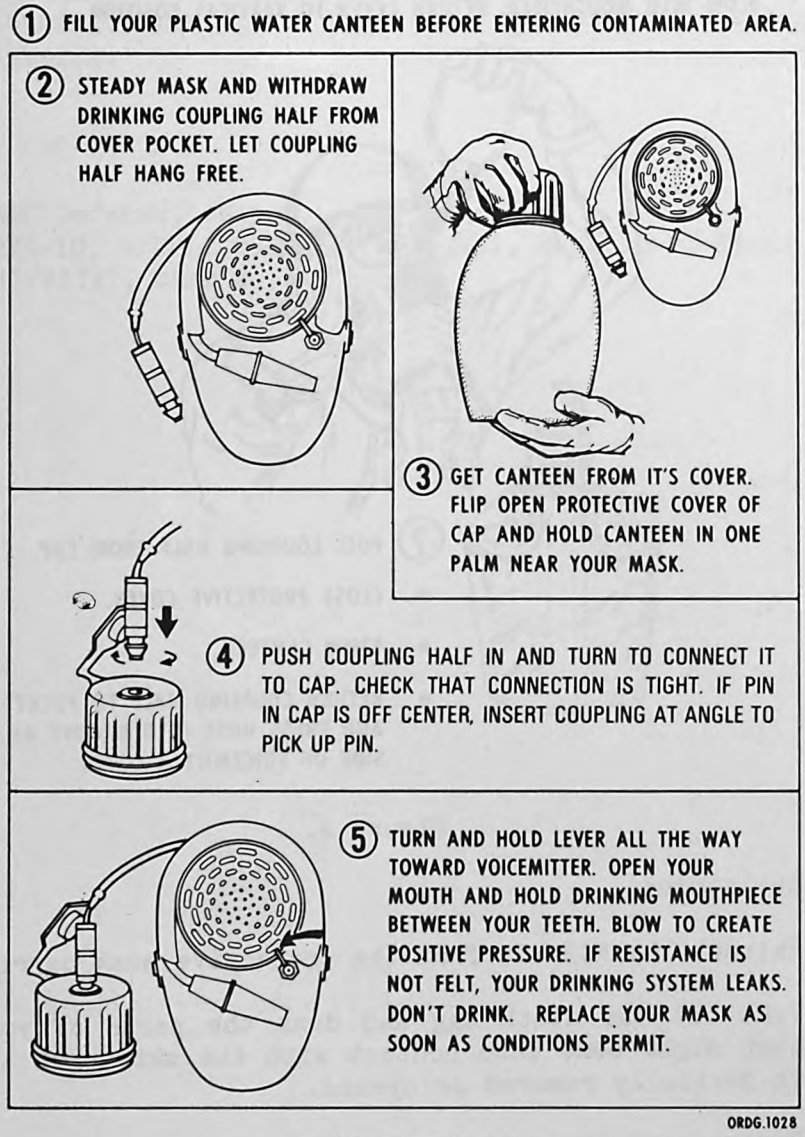
1 FILL YOUR PLASTIC WATER CANTEEN BEFORE ENTERING CONTAMINATED AREA.
2 STEADY MASK AND WITHDRAW DRINKING COUPLING HALF FROM COVER POCKET. LET COUPLING HALF HANG FREE.
3 GET CANTEEN FROM IT'S COVER. FLIP OPEN PROTECTIVE COVER OF CAP AND HOLD CANTEEN IN ONE PALM NEAR YOUR MASK.
4 PUSH COUPLING HALF IN AND TURN TO CONNECT IT TO CAP. CHECK THAT CONNECTION IS TIGHT. IF PIN IN CAP IS OFF CENTER, INSERT COUPLING AT ANGLE TO PICK UP PIN.
5 TURN AND HOLD LEVER ALL THE WAY TOWARD VOICEMITTER. OPEN YOUR MOUTH AND HOLD DRINKING MOUTHPIECE BETWEEN YOUR TEETH. BLOW TO CREATE POSITIVE PRESSURE. IF RESISTANCE IS NOT FELT, YOUR DRINKING SYSTEM LEAKS. DON'T DRINK. REPLACE YOUR MASK AS SOON AS CONDITIONS PERMIT.
ORDG.1028

Figure 1.

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PERFORMANCE MEASURES (cont)

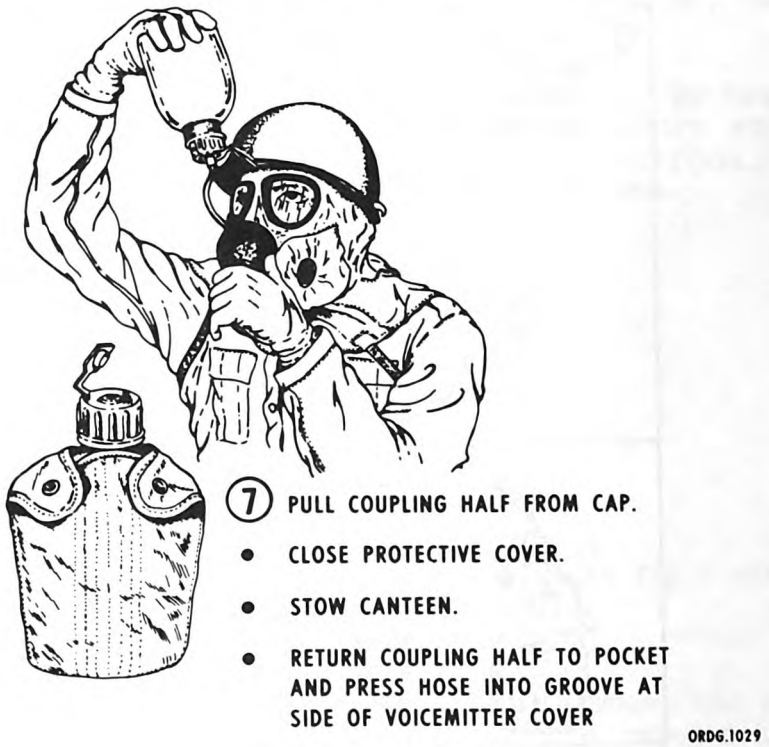
6 IF SYSTEM DOESN'T LEAK, RAISE AND INVERT CANTEEN. KEEP LEVER TURNED AND DRINK WATER FROM CANTEEN. DO NOT TILT HEAD BACK WHILE DRINKING. REPEAT THIS AS REQUIRED. WHEN FINISHED, TURN CANTEEN UPRIGHT AND AFTER SEVERAL SWALLOWS, ALLOW AIR IN MASK TO ENTER CANTEEN. BLOW INTO MOUTHPIECE. RETURN LEVER TO VERTICAL POSITION.
7 PULL COUPLING HALF FROM CAP.
• CLOSE PROTECTIVE COVER.
• STOW CANTEEN.
• RETURN COUPLING HALF TO POCKET AND PRESS HOSE INTO GROOVE AT SIDE OF VOICEMITTER COVER
ORDG.1029

Figure 2.

2. Use the latrine.

   a. Extract the M13 kit from the protective mask carrier.

   b. Take out the cloth bag and dust the parts of your clothing that might come into contact with the skin when the clothing is partially removed or opened.

   c. Remove/open those items of clothing that have to be removed/ opened to perform the function.

   d. Remove protective gloves before handling the undergarments.

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PERFORMANCE MEASURES (cont)

3. Sleep.

   a. Wear all protective clothing, mask, and hood.

   b. Use the "buddy" system to periodically check to ensure the clothing, mask, and hood do not become dislodged while sleeping.

REFERENCES

FM 21-40, NBC Defense, chap 5, pp 5-7 and 5-8.
TM 3-4240-279-10, w/C 1, Operator's Manual, Mask, C-B, Field, ABC M17/M17A1, chap 2.

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EXCHANGE FILTERS ON AN M17 SERIES PROTECTIVE MASK

CONDITIONS

Given an M17 series protective mask with filters that have been immersed in water, or damaged, or the initiation of chemical warfare and a pair of M13 series replacement filters.

STANDARDS

1. Filters have been replaced. After replacement due to initiation of chemical warfare, the filters are replaced at least once every 30 days.

2. Mask has been reassembled properly as indicated by the function check (see step 3 in performance measures). If a difficulty exists the supervisor is notified.

PERFORMANCE MEASURES

1. Remove the filter elements (fig 1).

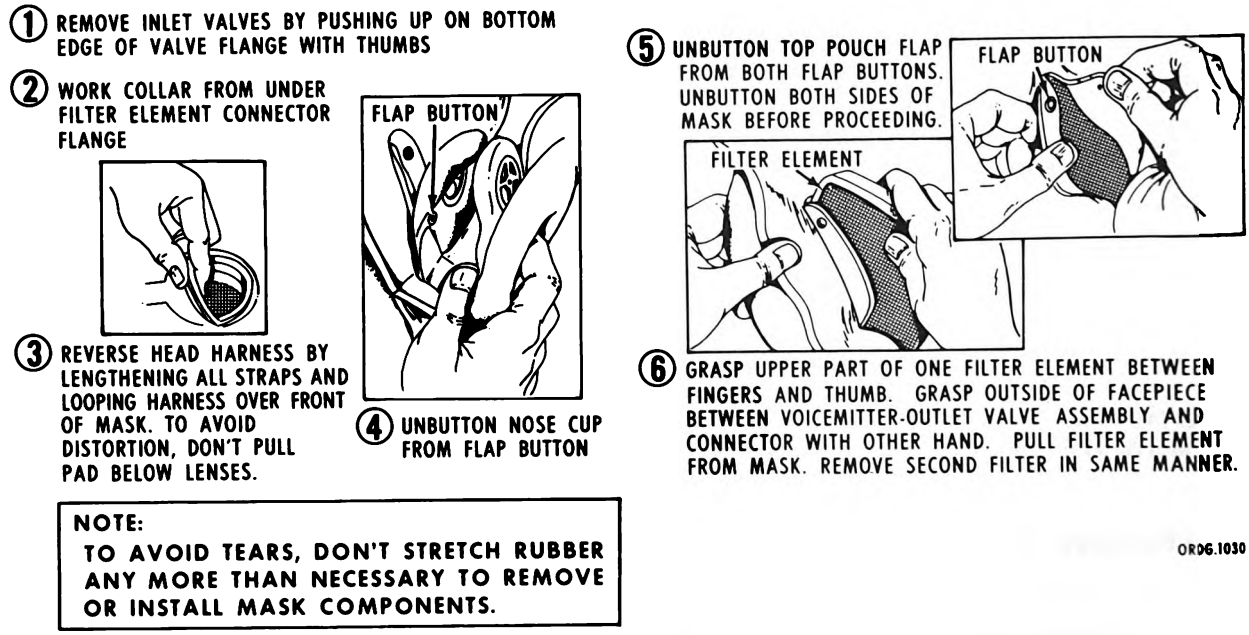
1 REMOVE INLET VALVES BY PUSHING UP ON BOTTOM EDGE OF VALVE FLANGE WITH THUMBS
2 WORK COLLAR FROM UNDER FILTER ELEMENT CONNECTOR FLANGE
3 REVERSE HEAD HARNESS BY LENGTHENING ALL STRAPS AND LOOPING HARNESS OVER FRONT OF MASK. TO AVOID DISTORTION, DON'T PULL PAD BELOW LENSES.
FLAP BUTTON
4 UNBUTTON NOSE CUP FROM FLAP BUTTON
5 UNBUTTON TOP POUCH FLAP FROM BOTH FLAP BUTTONS. UNBUTTON BOTH SIDES OF MASK BEFORE PROCEEDING.
FLAP BUTTON
FILTER ELEMENT
6 GRASP UPPER PART OF ONE FILTER ELEMENT BETWEEN FINGERS AND THUMB. GRASP OUTSIDE OF FACEPIECE BETWEEN VOICEMITTER-OUTLET VALVE ASSEMBLY AND CONNECTOR WITH OTHER HAND. PULL FILTER ELEMENT FROM MASK. REMOVE SECOND FILTER IN SAME MANNER.
NOTE:
TO AVOID TEARS, DON'T STRETCH RUBBER ANY MORE THAN NECESSARY TO REMOVE OR INSTALL MASK COMPONENTS.
ORDG.1030

Figure 1.

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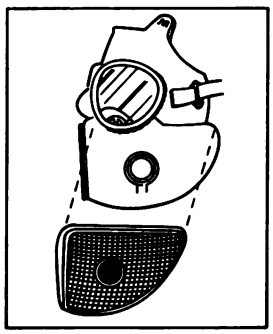
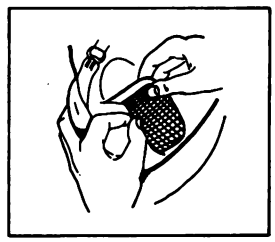
PERFORMANCE MEASURES (cont)

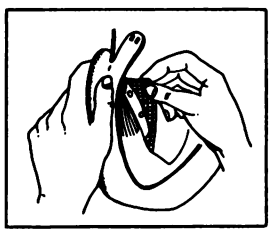
2. Replace the filter elements (fig 2 and 3).



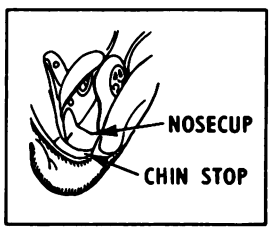
(7) FILTER ELEMENTS ARE MARKED EITHER RIGHT OR LEFT. ALINE FILTER ELEMENTS WITH OUTSIDE CONTOURS OF CHEEK POUCHES TO BE SURE YOU'RE INSTALLING THEM CORRECTLY.



(8) HOLD FILTER ELEMENT BY SQUARE CORNER WITH YOUR FINGERS ON CONNECTOR SIDE. PULL LOWER POUCH FLAP OUTWARD JUST ENOUGH TO OPEN CHEEK POUCH. INSERT CURVED EDGE OF ELEMENT INTO POUCH WITH A SLIGHT TURNING MOTION, PUSH ELEMENT UP INTO POUCH.



(9) GRASP CORNER OF ELEMENT FIRST INSERTED INTO MASK AND WORK ELEMENT INTO PLACE.



(10) ALLOW NOSECUP AND POUCH FLAPS TO FALL INTO NORMAL POSITION. CHECK THAT BOTTOM OF NOSECUP LIES ON TOP OF CHIN STOP SO MOIST EXHALED AIR DOESN'T ENTER POUCHES AND DAMAGE FILTER ELEMENTS.

ORDG.1031

Figure 2.

a. The word "top" on rim of inlet valve should be centered above the louvers inside the valve. To check position of the louvers, hold valve, with mesh side facing you, to a light source. Light spaces between louvers should diminish and disappear when bottom of valve is tilted toward light source. (If winterizing valve disks have been installed, they must be removed before light can be seen through louvers.) If word "top" is not centered or is missing, rotate valve until louvers are horizontal. Mark rim at point of top center with a dot of white paint. Reinstall disks if removed.

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PERFORMANCE MEASURES (cont)

b. Position valve over one side of connector with word "top" (if correctly located) or dot toward top of mask. Snap valve into place. Repeat for other valve.

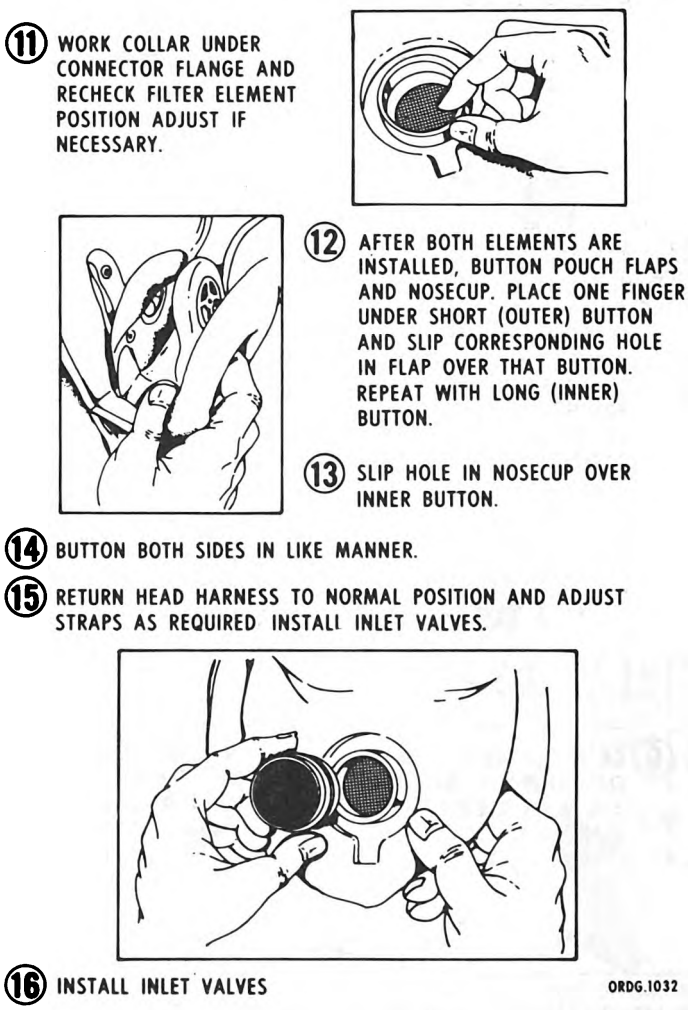
11 WORK COLLAR UNDER CONNECTOR FLANGE AND RECHECK FILTER ELEMENT POSITION ADJUST IF NECESSARY.
12 AFTER BOTH ELEMENTS ARE INSTALLED, BUTTON POUCH FLAPS AND NOSECUP. PLACE ONE FINGER UNDER SHORT (OUTER) BUTTON AND SLIP CORRESPONDING HOLE IN FLAP OVER THAT BUTTON. REPEAT WITH LONG (INNER) BUTTON.
13 SLIP HOLE IN NOSECUP OVER INNER BUTTON.
14 BUTTON BOTH SIDES IN LIKE MANNER.
15 RETURN HEAD HARNESS TO NORMAL POSITION AND ADJUST STRAPS AS REQUIRED INSTALL INLET VALVES.
16 INSTALL INLET VALVES
ORDG.1032

Figure 3.

3. Perform a function test.

a. Put on the mask.

b. Clear the mask.

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TASK SUMMARY 031-503-1010 (cont)

PERFORMANCE MEASURES (cont)

c. Check the seal.

d. If you cannot obtain a seal or cannot breathe, check to see if the mask has been reassembled properly.

e. If the difficulty still exists, notify your supervisor.

REFERENCES

TM 3-4240-279-10 w/C 1, Operator's Manual, Mask, Chemical-Biological: Field, ABC-M17/M17A1 and Accessories, chap 3, sec III, pp 3-6 thru 3-8.

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PERFORM OPERATOR'S MAINTENANCE ON AN M24, M25, OR M25A1 PROTECTIVE MASK

CONDITIONS

Given a dirty M24, M25, or M25A1 protective mask, carrier, accessories authorized to be stored in the carrier (per unit SOP), TM 3-4240-280-10, a pail of soapy water, a pail of clear rinse water, rags, and small brush.

STANDARDS

1. All components and accessories authorized by unit SOP are present; any that are missing are reported to your supervisor.

2. All deficiencies not requiring higher echelon support have been corrected. Those which do require such support are reported to your supervisor.

3. Mask and carrier are free of dirt, sand, and grit.

PERFORMANCE MEASURES

1. Inspect mask and carrier.

    a. Remove the mask from the carrier and check to ensure that all components are present (fig 1). Ensure the accessories authorized by your unit SOP are present (fig 2). Inform your supervisor if any components or accessories are missing.

    b. Check the carrier for superficial dirt, mildew, rips, torn straps, and missing hardware.

    c. Check the facepiece for holes, tears, splits, and signs of deterioration of rubber parts.

    d. Check the filter canister to make sure it is serviceable.

    e. Check the head harness for dirt and mildew; worn, frayed, or broken straps; and missing clinch tips.

    f. Correct deficiencies which you are allowed to correct at your level (see TM 3-4240-280-10, chap 31, para 3-1).

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PERFORMANCE MEASURES (cont)

g. Notify your supervisor of any damage that calls for repair or replacement of parts at higher level.

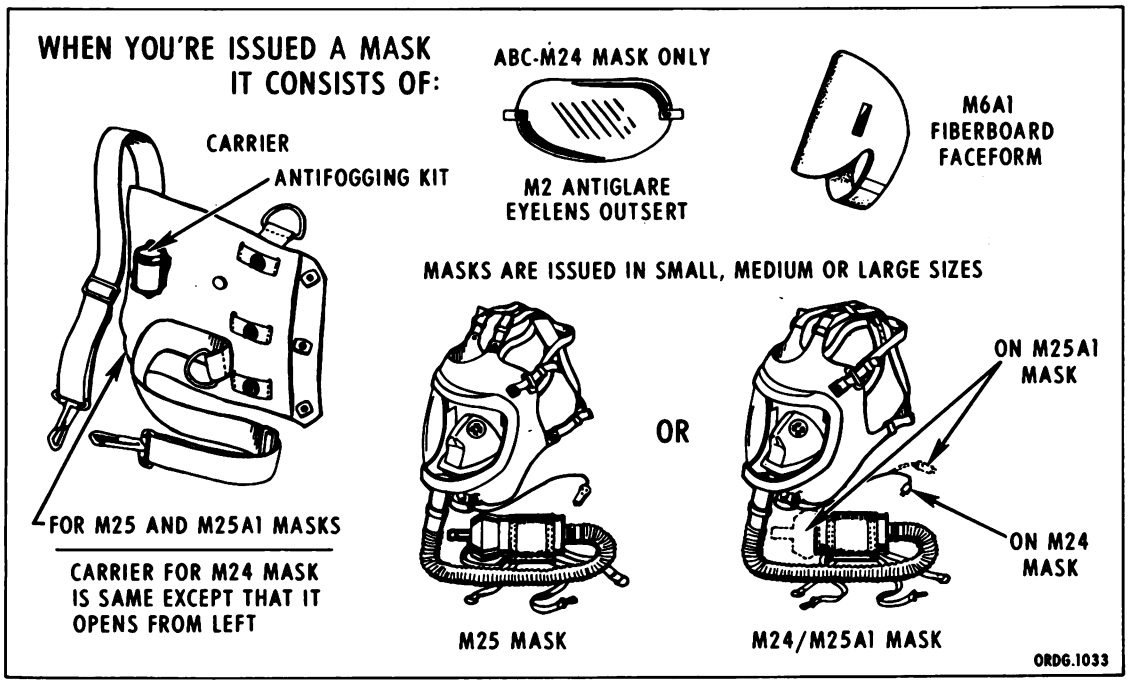

Figure 1.

2. Clean the mask.

a. If there is a hood, keep it attached to the mask.

b. Clean the facepiece and hood inside and out with a clean cloth that has been dipped in warm soapy water and wrung almost dry, or a brush that has soft bristles.

c. Rinse by wiping with a clean cloth that has been dipped in warm clear water and wrung almost dry.

d. Either wipe the facepiece with a clean, lint-free cloth or air-dry the facepiece.

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PERFORMANCE MEASURES (cont)

e. If the nosecup valve disks become detached while the facepiece is being cleaned, reinstall them.

f. Apply antifogging compound to the eyelens after the facepiece is dried.

g. Brush or wipe off superficial dirt or mildew from hose and canister.

h. Reassemble the mask.

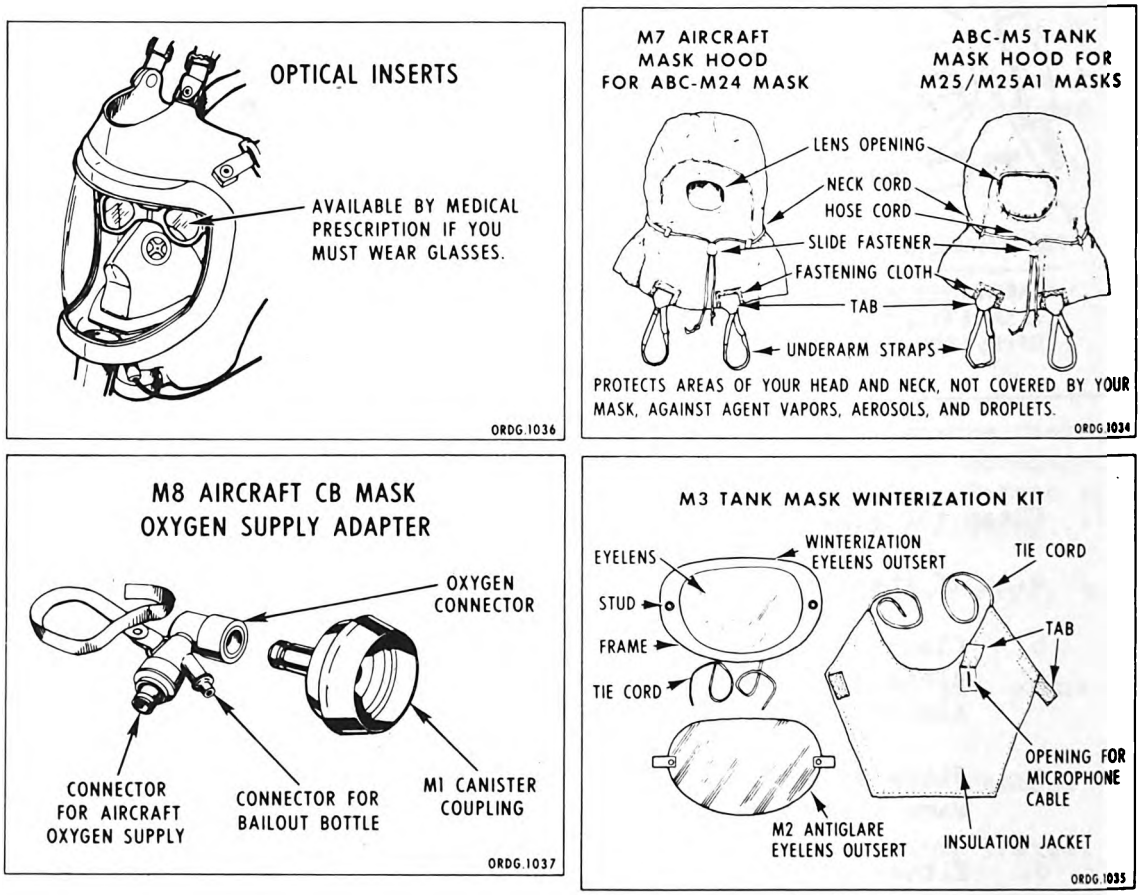

Figure 2.

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PERFORMANCE MEASURES (cont)

3. Clean the carrier.

   a. Empty the carrier pockets.

   b. Brush the carrier both inside and out to remove sand or grit.

   c. If the carrier is soiled, clean it with a brush dipped in clear, cold water.

   d. Put components and authorized accessories back in the carrier.

REFERENCES

TM 3-4240-280-10, Operator's Manual, Mask, Chemical-Biological: Aircraft, ABC-M24 and Accessories and Mask, Chemical-Biological: Tank, M25/M25A1 and Accessories, chap 3, sec II, para 3-3; sec III, para 3-4.

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PUT ON AND WEAR AN M24, M25, OR M25A1 PROTECTIVE MASK

CONDITIONS

Wearing a protective mask carrier containing a prefilled M24, M25, or M25A1 protective mask, and given an alarm for a surprise NBC attack, exposed to a chemical or biological attack without warning, or ordered to put on the mask.

STANDARDS

1. Properly put on, seat, clear, and check the protective mask within 9 seconds after the signal. If wearing the combat vehicle crewman (CVC) helmet, the action must be completed within 15 seconds.

2. If the hood is present, pull it over the shoulders, zip the hood, and adjust the drawstrings within an additional 6 seconds. Secure the straps before continuing operations.

3. Wear the mask (and hood) for at least 6 hours while performing your duties.

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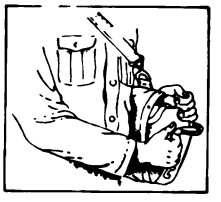
PERFORMANCE MEASURES

(1) STOP BREATHING

(2) REMOVE HELMET. PLACE IT BETWEEN YOUR KNEES.

(3) WITH LEFT HAND, OPEN CARRIER. PULL FLAP BETWEEN SNAP FASTENERS. WITH RIGHT HAND GRASP MASK BY TOP OF FACEPIECE AT FOREHEAD STRAPS AND WITHDRAW FROM CARRIER. ALLOW HOOD (IF ATTACHED) TO HANG INSIDE-OUT IN FRONT OF FACEPIECE. FOR M24 MASK USE OPPOSIT HANDS, SINCE CARRIER IS ON RIGHT SIDE.



M25/25A1 SHOWN
M24 OPPOSITE

(4) OPEN FACEPIECE BY PLACING THUMBS UNDER AND LITTLE FINGERS OVER NECK STRAPS. PLACE REMAINING FINGERS OVER TEMPLE STRAPS. SEPARATE HANDS TO OPEN FACEPIECE. PUT CHIN IN MASK CHIN POCKET AND LIFT HANDS OVER HEAD.

CAUTION

DO NOT SNAP FACEPIECE WIDE OPEN. ESPECIALLY IN FREEZING TEMPERATURES, AS THIS MAY TEND TO DAMAGE LENS. OPEN FACEPIECE SMOOTHLY AND GENTLY.

(5) SLIP HEAD HARNESS OVER YOUR HEAD AS YOU PULL MASK UP ONTO YOUR FACE. (NEVER PUT HEAD HARNESS OVER HEAD FIRST AND PULL MASK DOWN OVER YOUR FACE.)

(6) MAKE SURE HEAD HARNESS STRAPS AND PAD LIE FLAT AGAINST YOUR HEAD. USE UPWARD AND BACKWARD STROKES OF HANDS TO SMOOTH EDGES OF FACEPIECE AND PRESS THEM AGAINST FACE.

(7) CLEAR YOUR MASK. PLACE ONE PALM OVER OPENINGS AT BOTTOM OF OUTLET VALVE COVER . EXPEL AIR HELD IN YOUR LUNGS FORCEFULLY SO THAT IT ESCAPES AROUND FACEPIECE.

(8) CHECK MASK FOR LEAKS. SEAL CANISTER INLET BY PRESSING PALM OF HAND OVER OPENING IN CANISTER COUPLING AND INHALE LIGHTLY. IF MASK COLLAPSES AGAINST YOUR FACE AND REMAINS COLLAPSED, WHILE YOU HOLD BREATH, IT IS LEAK TIGHT. IF MASK DOESN'T COLLAPSE, CHECK FOR HAIR, CLOTHING OR OTHER MATTER BETWEEN MASK AND YOUR FACE. TIGHTEN STRAPS IF NECESSARY, AND RECHECK.

(9) RESUME NORMAL BREATHING.

ORDG.1038

Figure 1.

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PERFORMANCE MEASURES (cont)

1. Put on and wear the M24 mask.

   a. Don helmet.

      Note. You may experience more pressure than normal if the headgear is worn too far forward over the mask. To relieve the increased pressure, place the helmet back off the forehead or use a larger helmet.

   b. Snap carrier closed.

   c. Disconnect boom microphone from helmet.

   d. Connect mask microphone to receptacle in helmet.

   e. Turn shirt or jacket collar up so that it fits around your neck.

   f. Don hood over helmet and fit opening in hood around rubber eyelens frame on facepiece.

   g. Adjust neck cord so it rests over your upturned collar. Tighten neck cord to a snug fit.

   h. Adjust underarm straps to obtain snug, yet comfortable fit.

2. Put on and wear the M25/M25A1 mask.

   a. Don helmet over hood.

      Note. Grasp helmet shell inside helmet next to earcups with hands spread as far as possible. Place helmet over head and tilt it forward slightly so that first contact when donning is with forehead periphery of mask. Rotate helmet back and down over head until it is seated in position. Carefully remove hands so that seal between mask and facepiece is not broken.

   b. Snap carrier closed.

   c. Adjust underarm straps to obtain snug, yet comfortable fit.

   d. Disconnect boom microphone from helmet.

   e. Connect mask microphone to receptacle in helmet.

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PERFORMANCE MEASURES (cont)

f. When M25/M25A1 mask is worn inside a combat vehicle, couple mask to filter unit in vehicle.

REFERENCES

TM 3-4240-280-10, Operator's Manual, Mask, Chemical-Biological: Aircraft, ABC-M24 and Accessories; and Mask, Chemical-Biological: Tank, M25/M25A1 and Accessories, chap 2, fig 2-9.

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INSPECT FILTER CANISTER ON AN M24, M25, OR M25A1 PROTECTIVE MASK

CONDITIONS

Given an M24, M25, or M25A1 protective mask.

STANDARDS

1. Correctly determine if canister is serviceable or not.
2. Turn in mask for replacement of canister if the canister is unserviceable.

PERFORMANCE MEASURES

1. Inspect the canister for serviceability. If any of the following defects are present, the canister is unserviceable.
   a. Evidence that it has been immersed in water.
   b. Damage to the nozzle; e.g., heavily rusted or loose.
   c. Rust or pitting over large areas of the canister body.
   d. Corrosion over 10% of the seams.
   e. Cracks, breaks, or dents over 1/4 inch deep.
   f. Valve disk does not cover the inlet.
   g. Lot number is missing on the canister or you receive a notice that the lot number on your canister is listed as unserviceable.
   h. Excessive resistance to breathing due to the canister being clogged with dust.
2. If the canister is unserviceable, turn in your mask to organizational maintenance for replacement of canister.

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REFERENCES

TM 3-4240-280-10, Operator's Manual, Mask, Chemical-Biological: Aircraft, ABC-M24 and Accessories; and Mask, Chemical-Biological: Tank, M25/M25A1 and Accessories, chap 2, fig 2-3.

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IDENTIFY A CHEMICAL AGENT USING ABC-M8 DETECTOR PAPER

CONDITIONS

Wearing a protective mask and gloves, and given an unknown liquid which may be a chemical agent and a book of ABC-M8 detector paper.

STANDARDS

Within 1 minute, determine if the unknown liquid is a nerve (V or G) or blister (H) agent.

PERFORMANCE MEASURES

1. Extract the book of ABC-M8 paper which is normally found in the protective mask carrier.
2. Remove the book of detector paper from the wrapping.
3. Tear out one sheet of paper.
4. Touch paper to the unknown liquid.
5. Try to match the color reaction on the paper to the color chart on the inside cover of the book.
6. Inform your supervisor of your findings. Continue to wear your mask, even if you do not get a match, as this is no indication that the substance is necessarily safe.

REFERENCES

FM 21-40, NBC Defense, app B, p B-11.

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PUT ON AND WEAR PROTECTIVE CLOTHING

CONDITIONS

In field or garrison, unassisted, given either the chemical protective overgarment or protective liner ensemble and one pair of socks and gloves.

Note. When the new protective overboots are issued, they will replace the sock donning in the performance measures.

STANDARDS

1. Clothing is put on properly; e.g., all closures fastened and no skin exposed.
2. Dressing is completed within 8 minutes.
3. Protective clothing is worn for at least 6 hours while performing your duties.

PERFORMANCE MEASURES

1. Procedure for putting on overgarment (fig 1).
   a. Remove boots.
   b. Replace boot socks with impregnated socks.
   c. Put on boots and tuck trouser cuffs in boots; lace tightly.
   d. Put on overgarment trousers, zip legs, and tie firmly; blouse over boots.
   e. Put on overgarment shirt, zip up, and fasten closures.
   f. Put on protective gloves and pull the cuff of the overgarment over the gloves.

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PERFORMANCE MEASURES (cont)

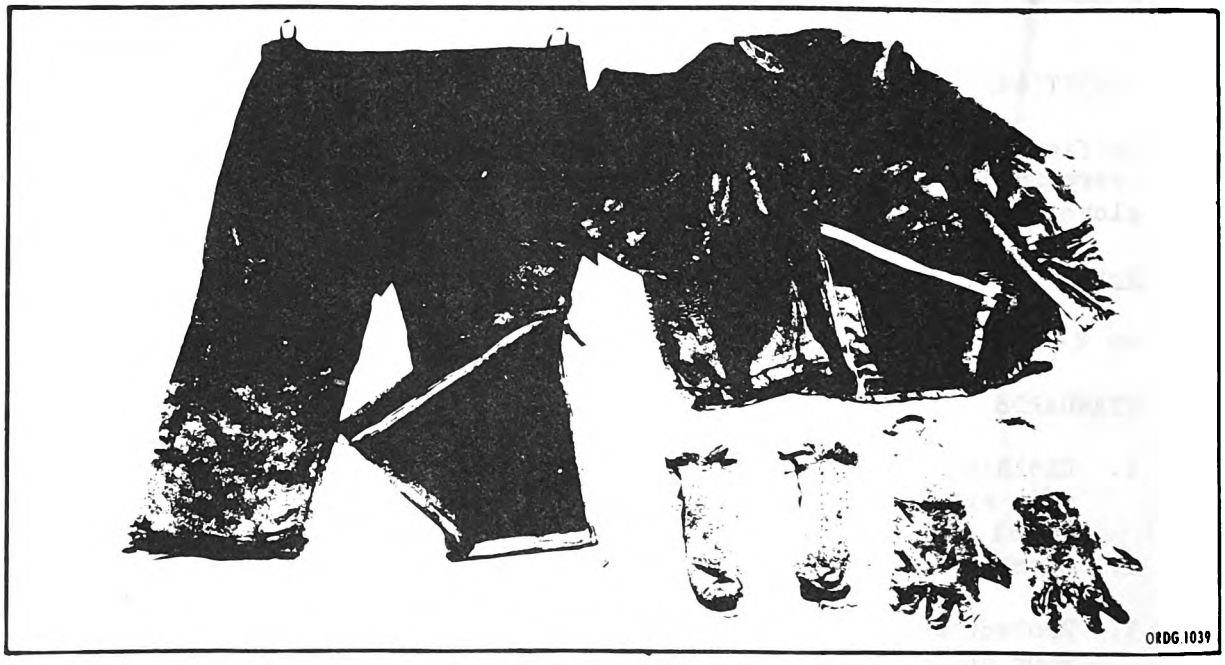

Figure 1.

2. Procedure for putting on liner ensemble (fig 2).

   a. Put on trouser liner.

   b. Put on outer trousers and attach liner waist tie tapes through belt loops of the outer trousers.

   c. Button inside gas flap button of trouser liner into right buttonhole, then button left outside of trouser liner to the same button.

   d. Put on protective socks and pull over top of the knitted cuff of the trouser liner.

   e. Put on boots and lace snugly. The upper portion of the boot must cover the top of the knitted cuff of the trouser liner and top of the sock. The cuff of the outer trousers is bloused over the top of the boot.

   f. Put on shirt liner. Button inside gas flap button into right buttonhole, then button left outside of liner to the same button.

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PERFORMANCE MEASURES (cont)

g. Tuck the shirttail of the liner inside the trouser liner.

h. Put on the outer shirt, button it, and leave shirttail outside.

i. Put on protective gloves. Pull upper portion of glove over knitted cuff of shirt liner. Sleeves of outer shirt fit over the upper portion of the gloves.

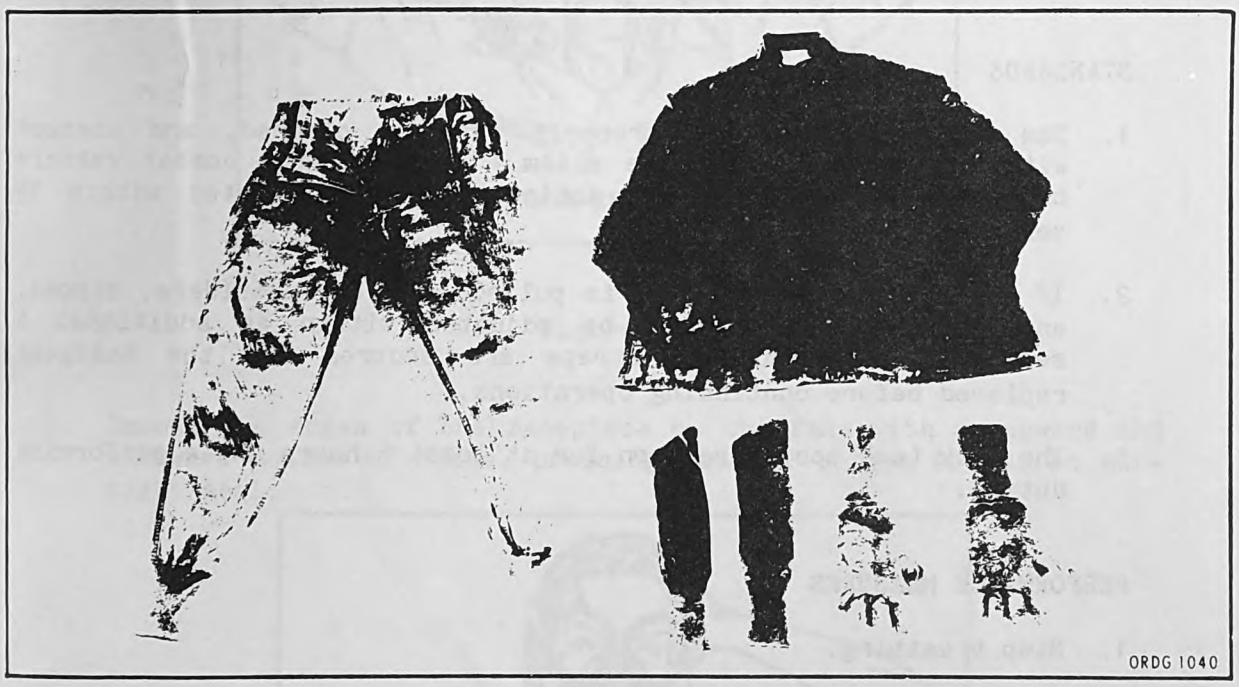

Figure 2.

3. Perform primary duties wearing the protective clothing.

REFERENCES

FM 21-40, NBC Defense, app B, pp B-1 and B-3.
TM 10-277 w/C 1 thru 3, Protective Clothing Chemical Operations, chap 12, sec III, para 12.

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PUT ON AND WEAR A PROTECTIVE MASK (M17-SERIES)

CONDITIONS

Wearing a protective mask carrier containing a prefitted M17-series protective mask, and given an alarm for a surprise NBC attack, exposed to a chemical or biological attack without warning, or ordered to put on the mask.

STANDARDS

1. The protective mask is properly put on, cleared, and checked within 9 seconds after the alarm. If wearing a combat vehicle crewman (CVC) helment, the action must be completed within 15 seconds.

2. If the hood is present, it is pulled over the shoulders, zipped, and the drawstrings must be adjusted within an additional 6 seconds. The underarm straps are secured and the headgear replaced before continuing operations.

3. The mask (and hood) are worn for at least 6 hours while performing duties.

PERFORMANCE MEASURES

1. Stop breathing.

2. Remove your headgear. Open the carrier with the left hand. (Headgear may be placed between the legs or on the muzzle of a rifle held between the legs.)

3. Hold the carrier open with the left hand and with the right grasp the mask just below the eyepieces and remove the mask.

4. Grasp the facepiece with both hands, sliding the thumbs up inside so that the facepiece is open the fullest extent.

5. Place chin in chin pocket, then pull the head harness over the head making sure that all head straps are straight and the head pad is centered.

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PERFORMANCE MEASURES (cont)

Figure 1.

6. Smooth the edges of the facepiece on the face with an upward and backward motion of hands, pressing out all bulges to get an air-tight seal.

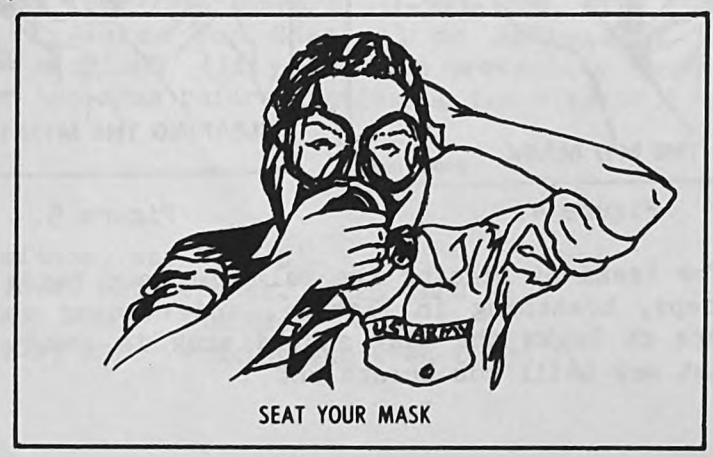

Figure 2.

7. To clear any gas from the mask, cup the heel of your hand over the outlet valve and blow hard. (For the M17A1 you must also place the other hand over the voicemitter.)

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PERFORMANCE MEASURES (cont)

Figure 3.

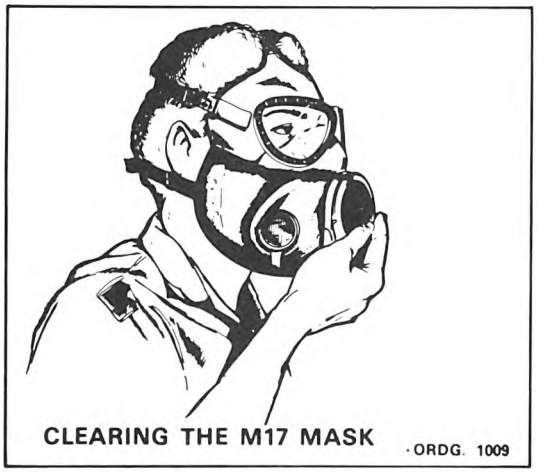

Figure 4.

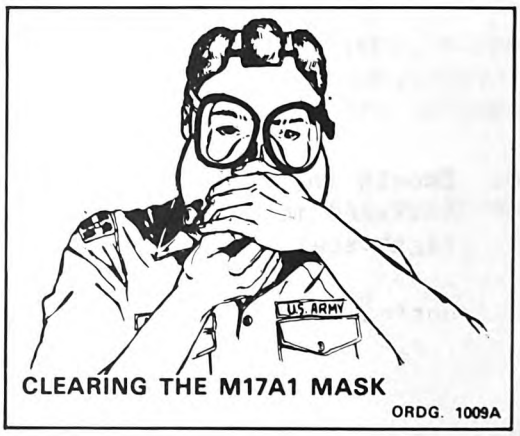

Figure 5.

8. Check for leaks by placing the palms of your hands over the inlet valve caps, breathing in lightly, and holding your breath. If there are no leaks the mask should suck in toward your face and stay that way until you breath out.

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PERFORMANCE MEASURES (cont)

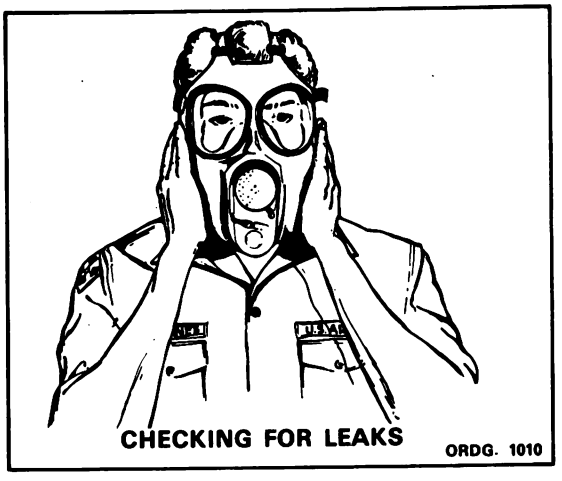

Figure 6.

9. If you have a protective hood, pull it over the shoulders, zip it, and adjust the drawstring.

10. Replace the headgear.

11. Give the alarm (see Task Summary 031-503-1006, Give Visual, Vocal, and/or Sound Alarms for Chemical or Biological Attack) and continue the mission. (If you have a protective hood, secure the straps under the arms before continuing the mission.)

REFERENCES

FM 21-40, NBC Defense, app D, p D1.
FM 21-41, Individual NBC Defense, pp 25 thru 27.
TEC 931-061-0060-F, NBC: The Mask.
TEC 931-061-0061-F, NBC: Masking and When to Do It.

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PREPARE A VEHICLE FOR NUCLEAR ATTACK

CONDITIONS

Given a track vehicle and simulated nuclear attack information.

STANDARDS

Complete all of the performance measures described below.

PERFORMANCE MEASURES

1. Position the vehicle behind the best available cover with the front of the vehicle oriented toward the expected blast (fig 1).

2. Point the gun away from the blast (fig 1).

Figure 1.

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PERFORMANCE MEASURES (cont)

3. Lock the brakes.

4. Secure loose equipment in the vehicle to avoid equipment damage or crew injury.

5. Remove all exterior components which could be damaged by the blast (water cans, duffle bags, etc.) and secure them inside.

6. Take down the antennas and store them inside the vehicle.

7. Remove all combustibles from outside the vehicle.

8. Close and lock all hatches and close ballistic shields.

9. Brace for the shock and protect your eyes.

10. Wear your helmet while in the vehicle.

REFERENCES

FM 17-12, Tank Gunnery, chap 8, p 8-5.
TEC 931-171-0301-F, Preparation of the M60 Series Tank/M551 ARAAV for Nuclear Attack, Part I.
TEC 931-171-0302-F, Preparation of the M60 Series Tank/M551 ARAAV for Nuclear Attack, Part II.

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DECONTAMINATE EQUIPMENT USING ABC-M11 DECONTAMINATION APPARATUS

CONDITIONS

In an NBC environment, wearing mask and gloves, given equipment contaminated with a persistent chemical agent, prefilled ABC-M11 decontaminating apparatus and directed to decontaminate the equipment.

STANDARDS

The equipment is decontaminated.

PERFORMANCE MEASURES

WARNING: DS2 is highly corrosive. DO NOT spray on personnel and avoid spraying fabric or clothing. For training, the M11 should be filled with water. It must be dried out thoroughly when finished to avoid rusting.

1. Remove the captive safety pin (fig 1).

2. Grasp the M11 in your left hand (fig 2) and lift up on the charging handle with your right. You should hear a hissing noise which indicates the compressed gas from the nitrogen cylinder has entered and charged the M11.

3. Pick up the M11 by the charging handle. Point it at the object to be decontaminated, hold it 6 to 8 feet away, and depress the thumb lever (fig 3). The charged M11 will last about 30 seconds, so care should be taken to prevent wasting the DS2.

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PERFORMANCE MEASURES (cont)

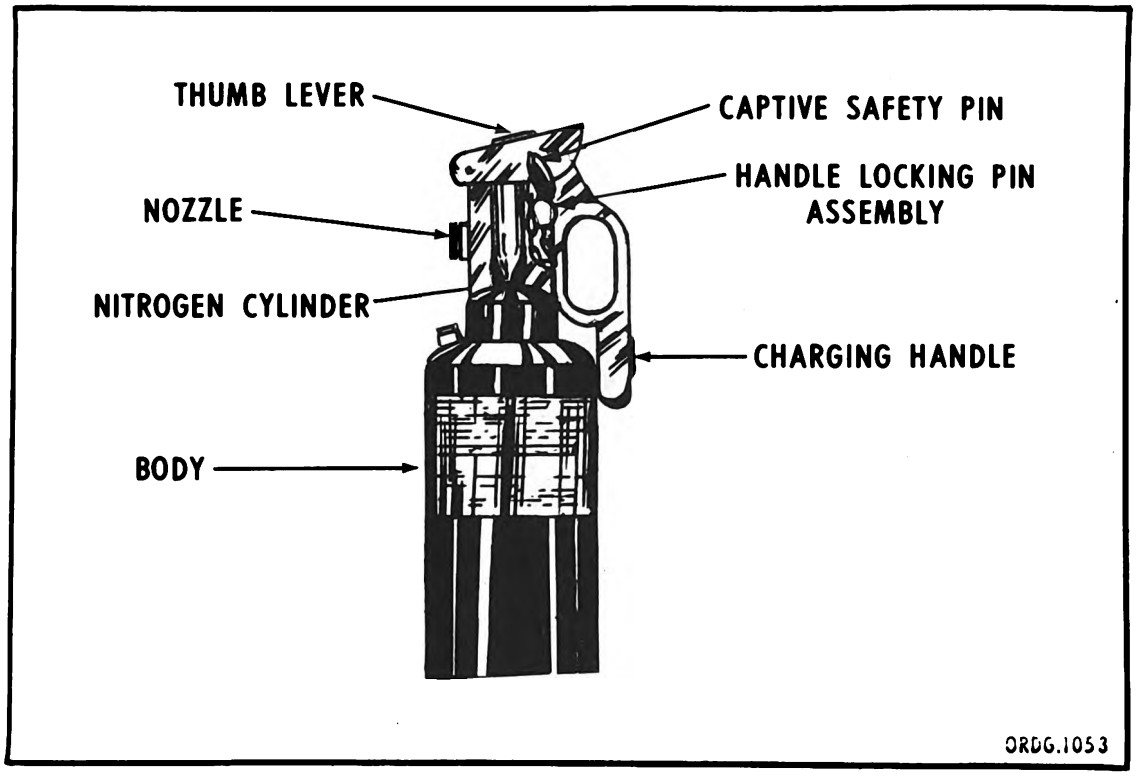

Figure 1.

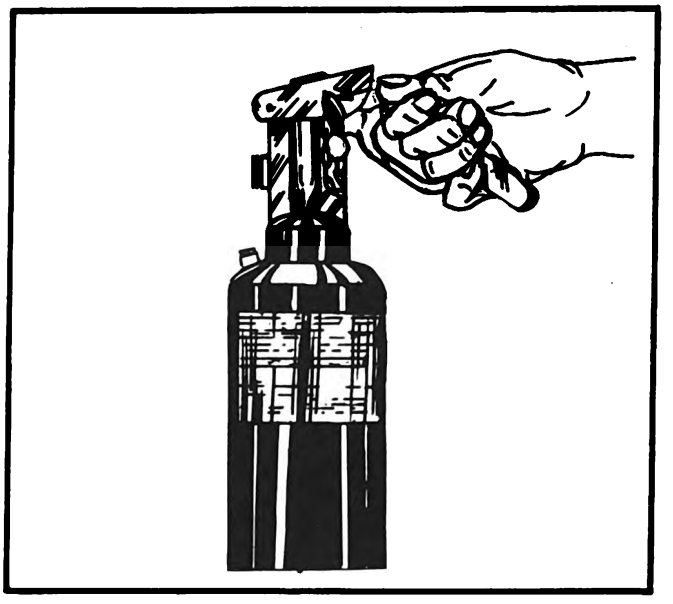

Figure 2.

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PERFORMANCE MEASURES (cont)

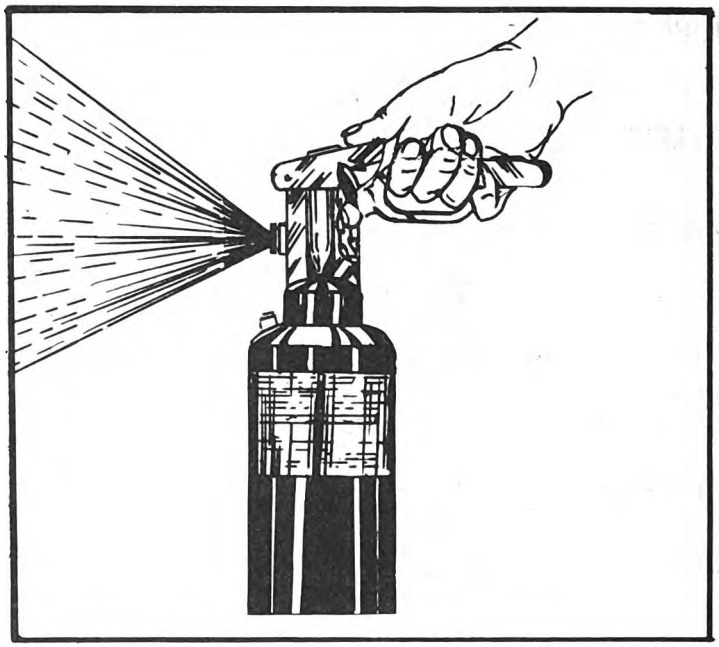

Figure 3.

4. Having sprayed the contaminated object, interrupt the flow by removing your thumb from the thumb lever.

5. Depress the handle locking pin, lower the charging handle, and replace the captive safety pin.

6. Follow unit SOP for refilling the M11.

REFERENCES

FM 21-40, NBC Defense, chap 5, pp 5-27 and 5-28.
TM 3-4230-204-13, Decontaminating Apparatus, Portable, DS2, 1-1/2 Quart, ABC-M11, chap 2, para 2-3 and 2-4.

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MEASURE RADIATION USING AN IM-9E/PD, IM-93/UD, IM-93A/UD OR IM-147/PD RADIAC INSTRUMENT

CONDITIONS

Given an IM-9E/PD, IM-93/UD, IM-93A/UD, or IM-147/PD dosimeter in an NBC environment.

STANDARDS

Determine the amount of radiation dosage received to within:

1. ± 5 milliroentgens for the IM-9E/PD.
2. ± 5 roentgens for the IM-93/UD or IM-93A/UD.
3. ± 5 roentgens for the IM-147/PD.

PERFORMANCE MEASURES

Clip the charged dosimeter to your clothing or any convenient object in the area to be checked. During or after suspected radiation exposure, read the calibrated scale of the dosimeter and determine the amount of radiation.

1. Read the calibrated scale.
   a. Look at a light source through the eyepiece lens of the dosimeter.
   b. Rotate the dosimeter until the calibrated scale is horizontal.
   c. Note the position of the shadow (hairline) on the calibrated scale.
2. Determine the amount of radiation. Since the calibrated scale of the dosimeter is linear, the total amount of radiation exposure for a selected period of time can be determined by subtracting the reading taken at the beginning of the time period from the reading taken at the end of the time period.

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PERFORMANCE MEASURES (cont)

EXAMPLE 1: If the reading of the calibrated scale of one IM-93/UD or IM-93A/UD (fig 1) is 0 roentgens at the start and 110 roentgens at the end, the total radiation exposure for the period is 110 roentgens.

EXAMPLE 2: If the reading on the calibrated scale of the IM-93/UD or IM-93A/UD is 75 roentgens at the start and 110 roentgens at the end, the total radiation exposure for the period is 35 roentgens.

EXAMPLE 3: If the reading on the calibrated scale of the IM-147/PD (fig 2) is 0 roentgens at the start and 45 roentgens at the end, the total radiation exposure for the period is 45 roentgens.

EXAMPLE 4: If the reading on the calibrated scale of the IM-147/PD is 20 roentgens at the start and 45 roentgens at the end, the total radiation exposure for the period is 25 roentgens.

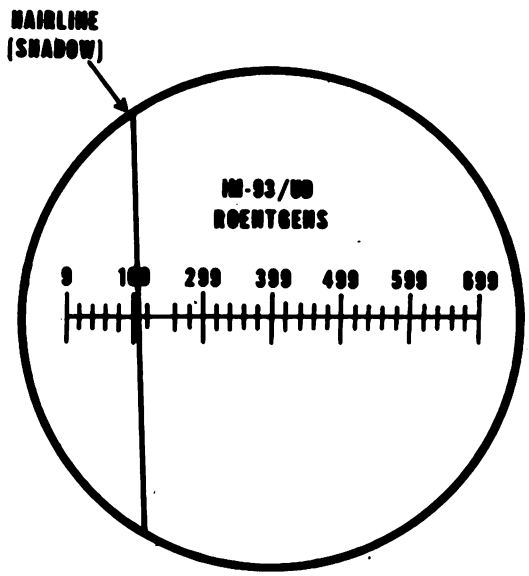

Figure 1. Calibrated scale of IM-93/UD or IM-93A/UD radiacmeter.

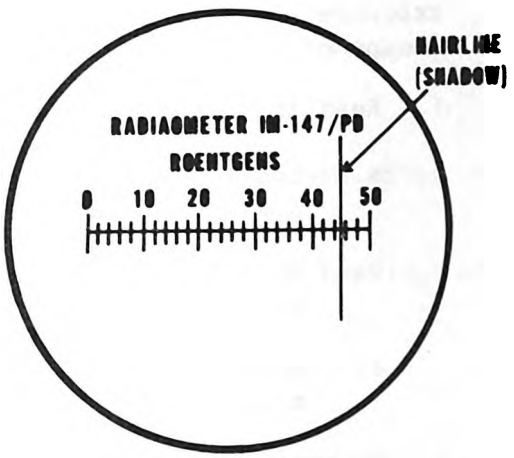

Figure 2. Calibrated scale of IM-147/PD radiacmeter.

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PERFORMANCE MEASURES (cont)

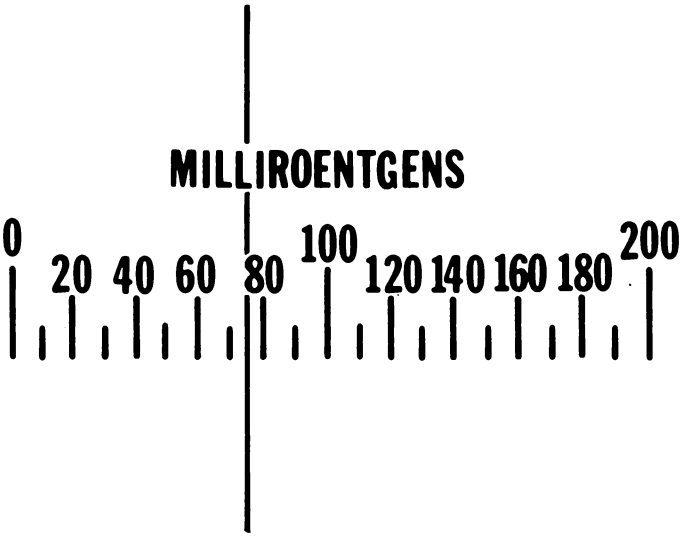

Figure 3. Calibrated scale of IM-93/PD radiacmeter.

REFERENCES

TM 11-6665-214-10 w/C 2, Operator's Manual for Radiacmeters, IM-9E/PD, IM-93/PD, IM-93A/UD, and IM-147/PD, chap 3, para 13, pp 17 thru 19.

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PROTECT SELF WHILE CROSSING A CONTAMINATED AREA

CONDITIONS

Given a mission which requires the crossing of a contaminated area and all standard protective clothing and equipment. Operational exposure guidance (OEG) and/or appropriate mission-oriented protective posture (MOPP) level has been established by the commander.

STANDARDS

The area is crossed safely.

PERFORMANCE MEASURES

1. Put on all protective clothing and equipment making sure all closures are fastened.
2. Fasten ABC-M8 detector paper (or liquid agent detector) on your clothing/equipment).
3. Report the reading on the dosimeter to your supervisor.
4. Cross as fast as possible, riding in a vehicle if available.
5. If a vehicle is available and time permits, place sandbags on the floor for shielding and travel in the buttoned-up mode.
6. Select routes along high ground and avoid contact with surfaces such as buildings, debris, woods, shrubbery, tall grass, and puddles which tend to hold the agents.
7. Try not to stir up dust.
8. Use the automatic chemical agent alarm and IM-174 radiacmeter to continuously monitor for contamination.
9. After crossing, if the mission permits, use your detection equipment to determine if decontamination is required, and decontaminate if necessary.
10. Read the dosimeter and report the reading to your supervisor.

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TASK SUMMARY 031-503-3004 (cont)

REFERENCES

FM 3-12 w/C 1 and 2, Operational Aspects of Radiological Defense, chap 5, para 5-6.
FM 21-40, NBC Defense, chap 2, p 3-2; chap 5, pp 5-5 thru 5-17; chap 7, pp 7-3 thru 7-7.
FM 21-41, Individual NBC Defense, pp 69 thru 70.

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SELECT TEMPORARY BATTLEFIELD POSITIONS

CONDITIONS

During daylight or darkness; at an overwatch position; after initial movement into tentative defensive positions; at a halt during movement; or upon receiving direct fire.

STANDARDS

1. Select and occupy a firing position which allows observation, fields of fire, and provides (in order of priority):

   a. Cover and concealment, or

   b. Cover only, or

   c. Concealment only.

2. Remain as low as possible (prone where possible) and look (aim) around rather than over objects.

PERFORMANCE MEASURES

Select temporary firing or observation positions which take advantage of available cover and concealment (fig 1).

1. Observe and fire around the side of an object. This conceals most of your head and body.

2. Stay low to observe and fire whenever possible. You can aim better and take advantage of concealing vegetation to present the smallest possible target to enemy observation and fires.

3. Select a good background before observing. A good background does not silhouette the individual.

4. Follow your leader's directions after your initial selection of temporary battlefield position; he might reposition you to gain better team coverage of the area.

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CAMOUFLAGE/CONCEAL SELF AND INDIVIDUAL EQUIPMENT

CONDITIONS

During daylight hours, given a camouflage paint stick(s), individual weapon, load-bearing equipment (LBE), helmet complete with accessories, a snow suit (white sheet or matress cover) if appropriate, burlap garnishing strips or cloth strips, charcoal or burnt cloth residue, and mud (if appropriate to area).

STANDARDS

Within 15 minutes, shade shiny areas or exposed skin with dark color and shadow areas with light color, alter clothing, load-bearing equipment, and weapon outlines to blend into predominant color of the background.

PERFORMANCE MEASURES

1. To camouflage exposed skin (fig 1):

    a. Paint the shiny areas--forehead, cheekbones, nose, and chin--with dark color.

    b. Paint the shadow areas--around the eyes, under the nose, and under the chin--with a light color.

    c. Paint the exposed skin on the back of your neck and hands with irregular patterns.

    d. When applying camouflage, use the buddy system--work with another man and check each other.

    e. Camouflage skin according to figure 2.

2. Camouflage the helmet according to figure 3.

3. Camouflage load-bearing equipment and weapons according to figure 4.

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PERFORMANCE MEASURES (cont)

(1) Rubber bands, or expedient bands made from old inner tubes or burlap strips, secure natural materials. (Note position of band.)

(2) Slits in burlap allow insertion of natural material.

(3) Form disrupted by burlap bows tied into slitted cover.

(4) Texturing diminishes shine from steel helmet.

(5) Burlap helmet cover pattern painted to break up solid color before natural materials are inserted.

(6) A disruptive paint pattern, with the pattern carried across the curved lines of the edges, especially those seen from the front.

Figure 3.

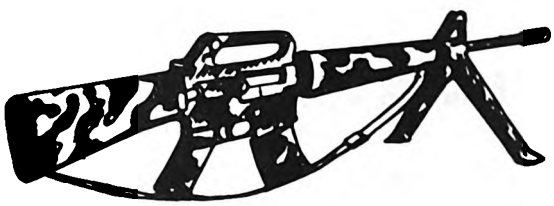

Figure 4.

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CAMOUFLAGE/CONCEAL EQUIPMENT

CONDITIONS

During daylight hours, given any item of military equipment in a field location, natural camouflage materials (foliage, grass, mud, snow, etc.) appropriate to the area, camouflage net(s), and basic-issue equipment.

STANDARDS

Within 30 minutes, conceal shiny parts, cover remaining surfaces with irregular patterns, and alter outlines to blend with predominant terrain background patterns.

PERFORMANCE MEASURES

1. Cover shiny areas of equipment with pattern paint, mud, etc. applied in irregular patterns so that the equipment blends with the colors of the natural surroundings (fig 1).

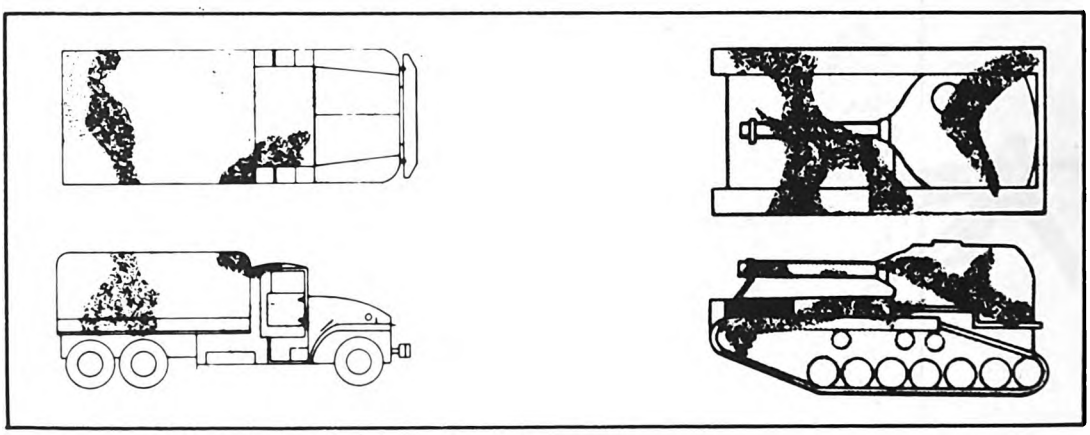

Figure 1.

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PERFORMANCE MEASURES (cont)

2. Alter the shape and size of the equipment (fig 2) with natural (foliage, grass, mud, etc.) and man-made materials.

Figure 2.

REFERENCES

FM 5-20, Camouflage, chap 3, pp 17 thru 20; chap 6, pp 35 thru 43.
TEC 937-061-0032-F, Cover, Camouflage, and Concealment, Part 3.

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CONDUCT SURVEILLANCE USING AN AN/PVS-2

CONDITIONS

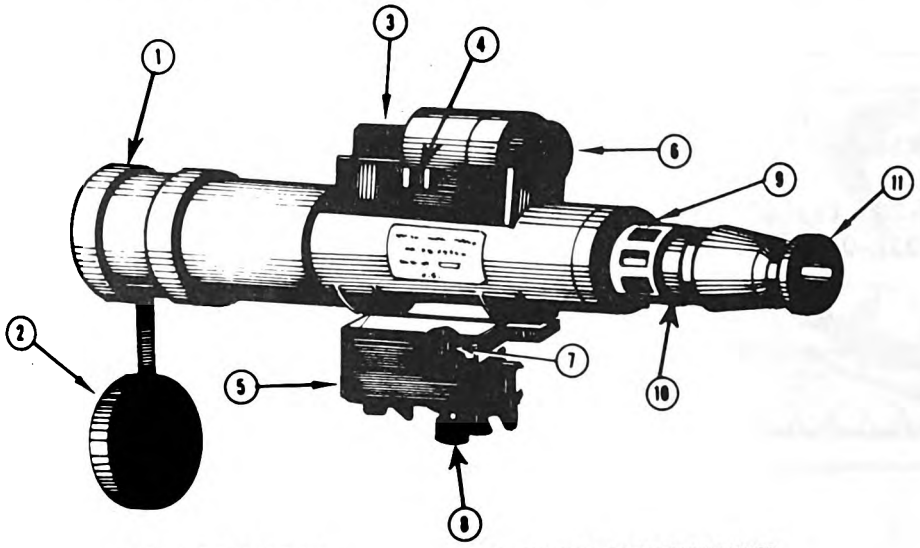
At night and in a field environment, given an operational AN/PVS-2 night vision sight with 5 BA-1100 batteries, and a sector of responsibility.

STANDARDS

1. Within 5 minutes, the AN/PVS-2 must be operational.
2. You must detect all targets in your assigned sector out to 300 meters.

PERFORMANCE MEASURES

1. Operate the AN/PVS-2.
   a. Install the battery (fig 1).



1. RANGE FOCUS RING
2. LENS CAP
3. OSCILLATOR CAP
4. POWER SWITCH
5. BORESIGHT MOUNT ASSEMBLY
6. BATTERY CAP
7. AZIMUTH ADJUSTMENT KNOB
8. ELEVATION ADJUSTMENT KNOB
9. DIOPTER SCALE
10. FOCUS RING
11. EYESHIELD

Figure 1.

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PERFORMANCE MEASURES (cont)

WARNING: Make sure the switch is in the OFF position before installing battery.

(1) Remove the battery cap in a counterclockwise direction.

(2) Install the battery with a positive terminal (raised end) into main housing.

(3) Install the battery cap in a clockwise direction onto the main housing. Tighten firmly to ensure a watertight seal.

b. Place the sight into operation.

WARNING: Always keep the lens cap on the objective lens when operating in daylight conditions.

(1) Place the power switch in the up position.

(2) Press your eye against the eyeshield to open the rubber security flaps.

(3) Set the diopter scale to zero and then adjust focusing for sharp sight reticle. Once this adjustment is made, no further adjustment should be necessary for the same operator.

(4) Adjust the range focus ring for a sharp image. During surveillance the operator will have to adjust the range focus to get a sharp image at different ranges.

c. After operation place the power switch in the OFF position.

Note. Do not repack the sight in the shipping container without removing the battery.

2. Detect the specific target as required. You can detect movement, observe terrain, the enemy, his own forces, and effectively execute surveillance during offensive and defensive operations with the AN/PVS-2. Viewing capabilities are only limited by ambient light levels.

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REFERENCES

FM 23-9, M16A1 Rifle and Marksmanship.
TC 23-11, AN/PVS, Night Vision Sight.
TM 11-5855-203-10; 23P, Operator's Manual: Night Vision Sight, AN/PVS-2.
TEC 953-071-0061-F, AN/PVS-2 Starlight Scope.

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USE CHALLENGE AND PASSWORD

CONDITIONS

Given a challenge, the current password and a defensive position with a designated sector of fire. You will be told that enemy and friendly personnel might enter your sector. You are to allow friendly personnel to pass only if they respond with the correct password and to detain other personnel if you are able.

STANDARDS

1. Detect and halt all personnel in your sector.

2. Challenge them using the correct challenge.

    a. If you are given the correct password, allow personnel to pass.

    b. If you are not given the correct password, disarm and detain personnel as you are able

PERFORMANCE MEASURES

1. If one man desires to pass:

    a. Seeing or hearing someone approach your position, and before that person gets close enough to pose a threat, command the person to "HALT!" Use a clear voice, just loud enough to be heard.

    b. Seeing the stranger halt, keep him covered and, without exposing your position, ask "WHO IS THERE?" Again, use a clear voice, just loud enough to be heard, so the enemy will not overhear if he is nearby.

    c. When the stranger identifies himself, such as "PRIVATE WILLARD, MESSENGER," you order him to "ADVANCE TO BE RECOGNIZED."

    d. Maintain your concealed position and keep the stranger covered with your weapon. When the stranger gets within 2 or 3 meters of you, again order him to "HALT!"

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PERFORMANCE MEASURES (cont)

e. Issue the challenge in a soft voice and wait for the stranger to reply with the correct password. Hearing the correct password, give permission to pass if you have no other reason to doubt. If doubt still exists, demand further identification, or ask a question only a friendly person would be able to answer.

2. If a group desires to pass.

a. The procedure and precautions for a group are almost the same as for one man. Seeing or hearing a group approach, before they are close enough to pose a threat, order them to "HALT!"

b. The leader of the group should identify the group, such as "FRIENDLY PATROL." Since you don't want the whole group to advance on you at once, order "ADVANCE ONE MAN TO BE RECOGNIZED."

c. When the leader has come forward to be recognized, give him the challenge and get the password in reply.

d. Once you are satisfied that the leader is friendly, have the rest of the patrol advance one-by-one, and let the leader identify each man.

e. Disarm and detain anyone not able to give the proper password or identify himself to your satisfaction. Then notify your immediate superior.

REFERENCES

FM 21-75, Combat Skills of the Individual Soldier and Patrolling, chap 2, pp 17 thru 21.
FM 22-6, Guard Duty, pp 9-1, 9-2; F-1 thru F-4.
TEC 935-071-1029-F, Counterintelligence.

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COLLECT/REPORT INFORMATION - SALUTE (SPOT REPORT)

CONDITIONS

Given a tactical situation which includes any number of enemy soldiers, engaged in any type of activity, who can be seen either with the naked eye or with binoculars.

STANDARDS

Give an oral report to your leader which describes each point of interest expressed by the letters of the key word SALUTE. (Location may be descriptive; need not be grid coordinates.)

PERFORMANCE MEASURES

1. Report all information quickly, completely, and accurately. The example report below shows how much detail is included in a complete report.

   "Seven men in civilian clothes, one carrying rifle and bandoleer, six carrying farm tools, entered the village of Friedberg (BN 223227) by SW gate at 211300 August. Same seven men, all with rifles and bandoleers, left Friedberg by NE gate 211300 August, walking NE on road to Ogau (BN 214230)."

2. A good way to remember how and what to report about the enemy is to use the letters of the word SALUTE.

a.	SIZE	The number of personnel seen or size of object.
b.	ACTIVITY	What the enemy was doing.
c.	LOCATION	Grid coordinates or reference from a known point including distance and direction (or azimuth) from the known point.
d.	UNIT	Describe any patches or clothing, distinctive signs or symbols, or ID numbers on vehicles.
e.	TIME	The time the activity was observed.
f.	EQUIPMENT	Describe or identify all equipment associated with the activity.

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PERFORMANCE MEASURES (cont)

3. Both oral and written reports may be accompanied by maps, photos, overlays, sketches, captured documents, enemy materiel, or anything else which may help convey the full meaning of the information you are reporting.

REFERENCES

FM 21-75, Combat Skills of the Individual Soldier and Patrolling.
TEC 935-071-1026-F, Collecting and Recording Information.

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IDENTIFY FRIENDLY AND THREAT (OPFOR) VEHICLES

CONDITIONS

In a field environment with friendly and Threat (opposing force/OPFOR) vehicles in sight.

STANDARDS

Within 8 seconds, identify each vehicle sighted as friendly or Threat.

PERFORMANCE MEASURES

1. Tank characteristics.

   a. Identification. Tank identification is designed around four areas common to all tanks:

      (1) Track and suspension system.

      (2) Turret.

      (3) Main gun.

      (4) Cupola.

   b. Track and suspension system. Many tanks can be recognized by their track and suspension systems. However, recognition by this feature alone is often difficult as the tracks will often be obscured by grass or other objects. To identify the track and suspension system, check to see if it has support or return rollers. Except for the T-10, M-1970, and T-72 tanks, most Warsaw Pact vehicles do not have these rollers.

      Note. When using this method to help identify tanks, keep in mind that the M551 Sheridan in the US Army also has no return rollers.

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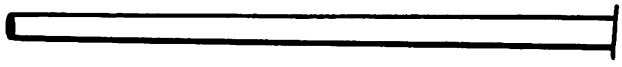
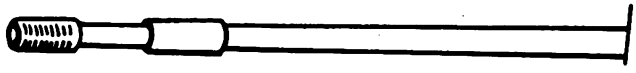
PERFORMANCE MEASURES (cont)

(2) Main gun bore evacuator and its location.



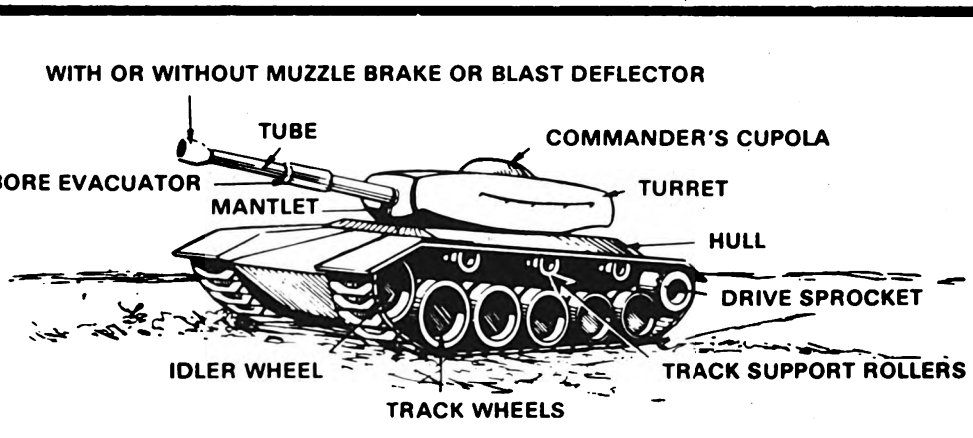
MAIN GUN WITHOUT BORE EVACUATOR

MAIN GUN WITH BORE EVACUATOR



MAIN GUN WITH BORE EVACUATOR AND MUZZLE BRAKE/BLAST DEFLECTOR

Note these common identification characteristics of both friendly and Threat tanks:



2. Tanks. Threat main battle tanks are smaller than the US main battle tank. They have a cruising range of about 300 miles without auxiliary fuel and can attain speeds of about 30 mph. Threat tank fire control is relatively simple compared to that of US tanks. Currently, they mount no rangefinder similar to those on US tanks. Most Threat main battle tanks are equipped with active infrared (IR) night viewing devices, and have a superior underwater snorkeling capability.

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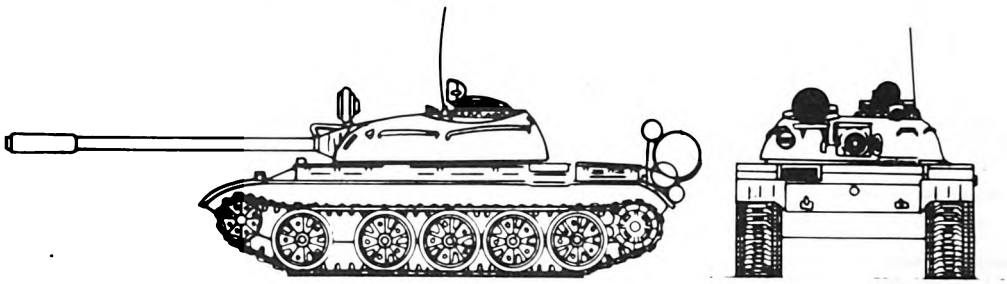
PERFORMANCE MEASURES (cont)

a. NATO nomenclature: T-55 tank.



RECOGNITION FEATURES:	Fully tracked; five roadwheels; space between first and second roadwheels; low-silhouette, sloped hull; dome-shaped turret mounted over third road-wheel; bore evacuator at muzzle; infrared headlights; infrared search-light for gun; seven variations of this model exist. (T-55 and T-55A may mount 12.7-mm AA machinegun.)
MAIN GUN RANGE:	1,500 meters
SPEED:	50 km/hr
RANGE:	500 km
USERS:	India, Israel (with 105-mm gun), People's Republic of China, United Arab Republic, USSR, Warsaw Pact
EMPLOYMENT:	Medium battle tank in armored formations.

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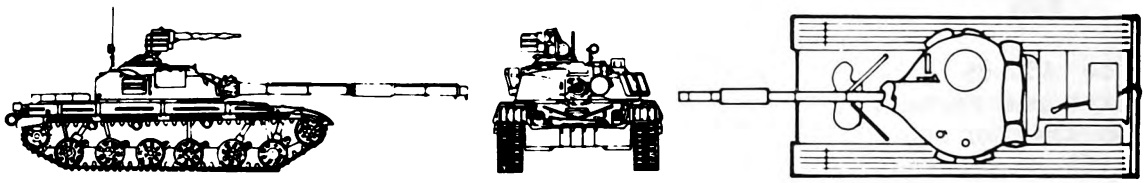
PERFORMANCE MEASURES (cont)

USERS:	United Arab Republic, USSR, Warsaw Pact
EMPLOYMENT:	Main battle tank (medium) in armored formations.

d. NATO nomenclature: T-64/T-72 medium tank.



RECOGNITION FEATURES:	Live track, complete with support rollers, centerguides, end connectors, and probably torsion bar suspension. Glacis plate is gently sloping and has a "V" shaped splash guard directly in front of driver's position; external fuel cells down both sides of tank; three equal size storage boxes on lefthand side of the turret. Main gun has bore evacuator about one-third down the gun tube from the muzzle end.
ARMAMENT:	1 - 115-mm main gun 1 - 12.7-mm AA machinegun (turret roof-mounted) 1 - 7.62-mm coaxial machinegun
MAIN GUN RANGE:	2,000 meters (approximately)
SPEED:	55 km/hr
RANGE:	500 km (approximately)
USERS:	USSR
EMPLOYMENT:	Main battle tank in armored formations.

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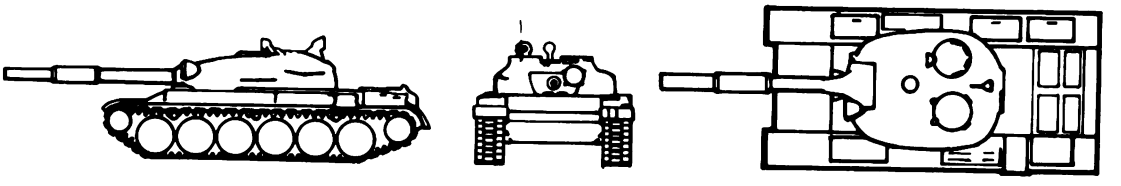
PERFORMANCE MEASURES (cont)

c. NATO nomenclature: M-1970 medium tank.



RECOGNITION FEATURES: Six evenly spaced roadwheels; well-sloped glacis plate; infrared unit on left of gun; driver's hatch center-front of hull; commander's hatch right of turret; bore evacuator first third of turret near muzzle.

ARMAMENT (probable): 1 - 115-mm smoothbore gun
1 - 7.62-mm coaxial machinegun
1 - 12.7-mm AA machinegun

SPEED: 60 km/hr (approximately

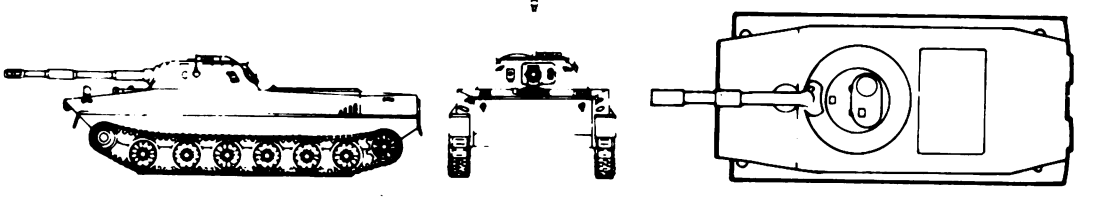
RANGE: 500 km (approximately)

USERS: USSR

MAIN GUN RANGE: 2,000 meters

EMPLOYMENT: Armored formations; possible replacement for T-62.

f. NATO nomenclature: PT-76 amphibious tank.



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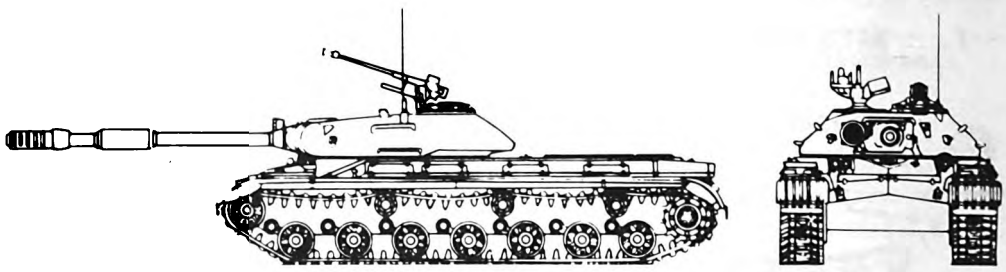
PERFORMANCE MEASURES (cont)

RECOGNITION FEATURES:	Fully tracked; six roadwheels; rectangular-shaped hull with a boat-like front; dish-type turret mounted over second roadwheel; chassis similar to BTR-50P; muzzle brake on main gun; bore evacuator close to muzzle.
ARMAMENT:	1 - 76-mm main gun 1 - 7.62-mm coaxial machinegun 1 - 12.7-mm AA machinegun (on some versions)
SPEED:	45 km/hr on land 10 km/hr on water
RANGE:	250 km
MAIN GUN RANGE:	1,000 meters
USERS:	People's Republic of China, United Arab Republic, USSR, Warsaw Pact
EMPLOYMENT:	Amphibious reconnaissance tank; personnel movement (up to six plus crew) in maneuver divisions and regiments.

g. NATO nomencalture: T-10.



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PERFORMANCE MEASURES (cont)

The T-10 heavy tank is rarely seen in Threat forward areas. This tank stays in the rear and is used in counterattacks or with tank killer units. It is equipped with infrared sights or devices for all crew members, and has seven pairs of roadwheels. Its primary weapon is a 122-mm stabilized gun firing kinetic energy armor-piercing cap and chemical energy high explosive antitank ammunition. It has two 12.7-mm machineguns, one for antiaircraft and another mounted coaxially with the main gun.

3. Strengths. The strengths of Threat main battle tanks are:

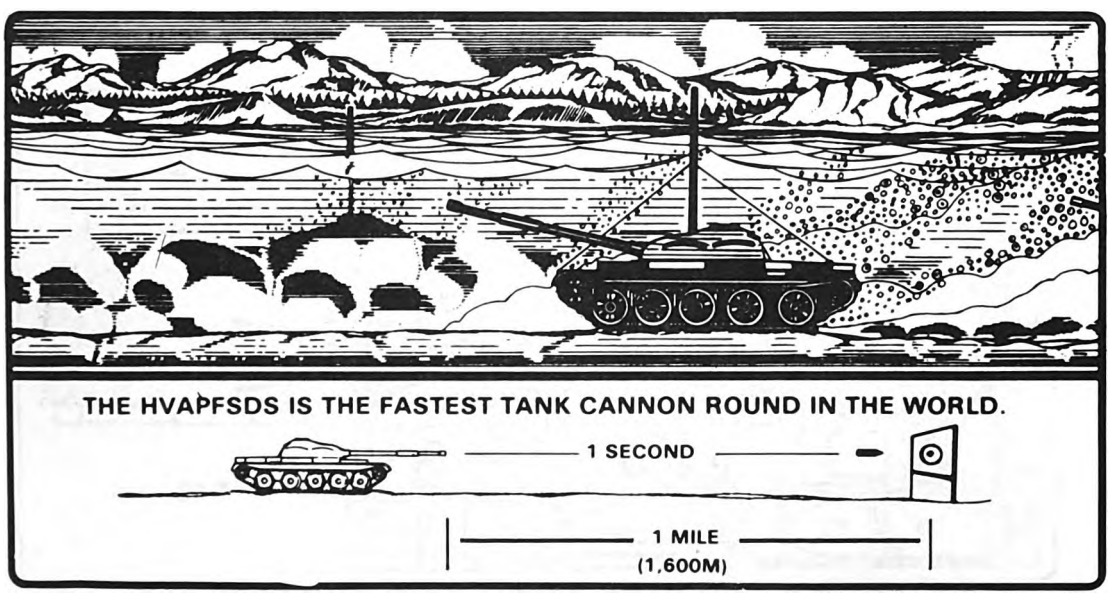
   a. Low silhouette, which makes them harder to hit.

   b. Simple fire control, which makes them easier to operate and maintain.

   c. Infrared night vision devices, which increase their effectiveness at night.

   d. Underwater snorkeling, which permits them to cross water barriers quickly.

   e. The high-velocity 115-mm APFSDS tank-defeating round, which travels a mile every second. The accuracy of this round gives T-62 tank crews a 50% chance of hitting a stationary target in the open with the first round at ranges to 1,500m, or a moving target traveling at a constant speed in the open at ranges to 1,000m.



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PERFORMANCE MEASURES (cont)

4. Weaknesses. The weaknesses of Threat main battle tanks are:

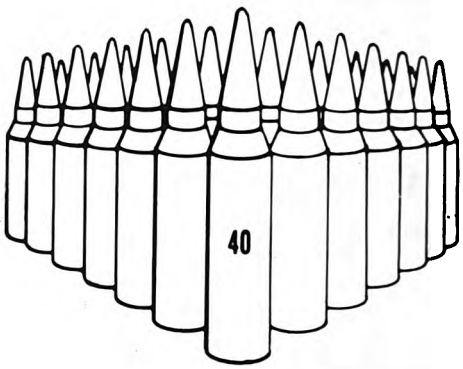
a. Threat tank fighting compartments are considerably smaller than those in US tanks. The crew is cramped and freedom to move is restricted. Crew fatigue can therefore be a bigger factor in Threat tanks.

b. Smaller turret interior and larger (115-mm) main gun ammunition means that Threat tanks have a slower rate of fire than US tanks.

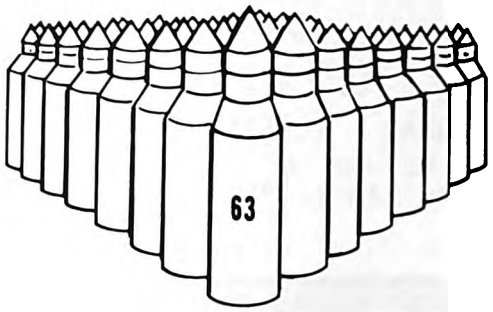
c. Because of its small fighting compartment, the T-62 tank has 23 fewer rounds of main gun ammunition than the M60A1. Therefore, in tank duels Threat tanks may run out of ammunition sooner than US tanks.

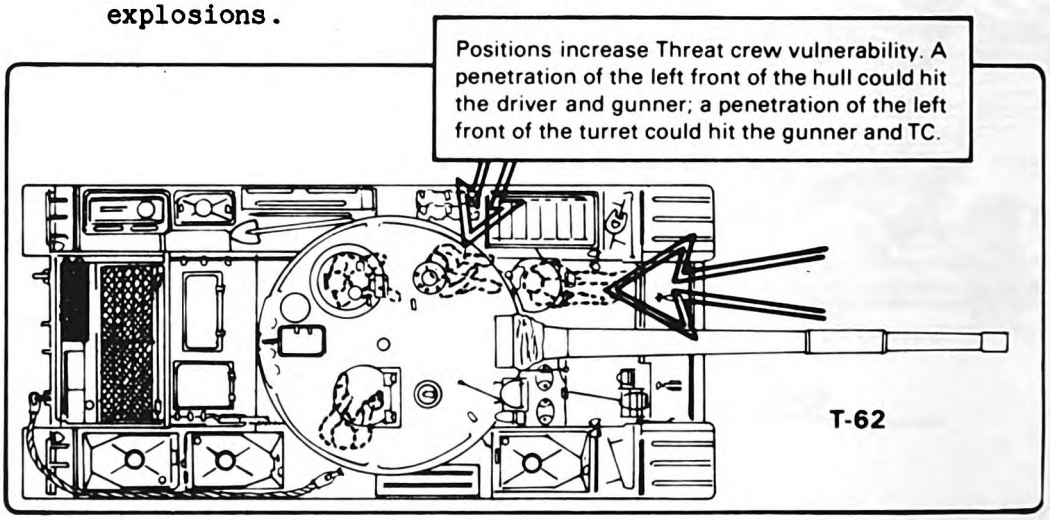
d. Some main gun ammunition is strapped along the turret walls, and hits above the turret ring may cause secondary ammunition explosions.

T-62



M60A1




Positions increase Threat crew vulnerability. A penetration of the left front of the hull could hit the driver and gunner; a penetration of the left front of the turret could hit the gunner and TC.
T-62

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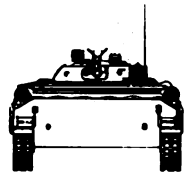
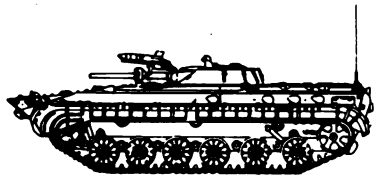
PERFORMANCE MEASURES (cont)

5. Infantry Combat Vehicles (ICV).

a. NATO Nomenclature: BMP.





The amphibious BMP is used as both a reconnaissance and an armored fighting vehicle. The armored infantry version of the BMP has a crew of three--gunner, driver, and vehicle commander and has a rear compartment troop capacity of eight. There are four periscopes and firing ports on each side allowing the infantry to fire from inside the vehicle while on the move. Its main armament is a 73-mm smoothbore gun with a Sagger missile rail mounted over the gun. A 7.62-mm PKT coaxial machinegun is mounted on the turret. Each BMP has racks for two Sagger missiles.

RECOGNITION FEATURES: Six roadwheels, tracked, amphibious, (ICV); engine in front; two doors in rear; four hatches in top of crew compartment; low silhouette with flat revolving turret. (May have Sagger mounted above gun.)

EMPLOYMENT: Motorized rifle units.

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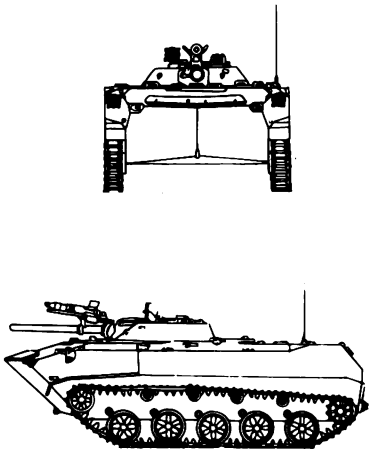
PERFORMANCE MEASURES (cont)

b. NATO nomenclature: BMD.



The airborne amphibious combat vehicle, BMD, resembles the BMP. It has five evenly spaced roadwheels on each side and is 5m long. It is air droppable, carries six troops, and has a turret similar to the BMP with a 73-mm gun and a Sagger missile launch rail. The BMD is amphibious and has a water propulsion system similar to the PT-76.

RECOGNITION FEATURES: Five evenly spaced roadwheels; turret mounts the same as on the BMP; rear crew compartment, amphibious.

EMPLOYMENT: Motorized rifle units.

6. Scout Vehicles.

a. NATO Nomenclature: BRDM-2.

The BRDM-2 is a four-wheel-drive amphibious scout car adaptable for many uses on the battlefield. It can be used as a command vehicle, an NBC test vehicle, an antiarmor vehicle, or an ADA vehicle. Crosscountry mobility is improved by a centralized tire pressure regulation system, and by four retractable auxiliary drive wheels located under the center of the vehicle which can be lowered to aid flotation and help in crossing gaps. The rear mounted power plant is improved over that of the first BRDMs. Its armament is a turret-mounted 14.7-mm machinegun. Its armament in the basic reconnaissance car is two machineguns mounted on the turret.

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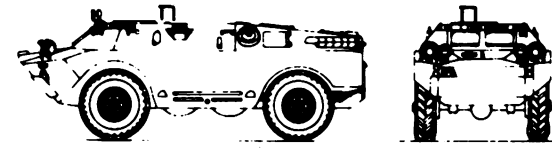
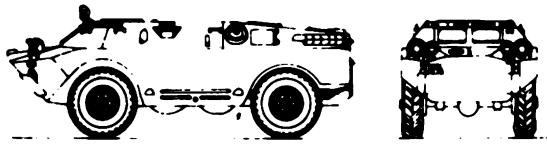
PERFORMANCE MEASURES (cont)

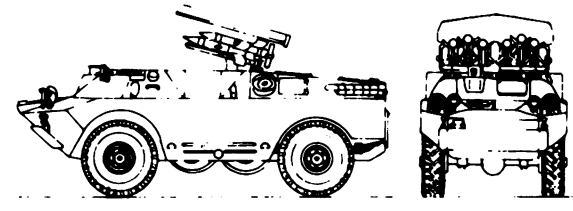
BRDM-2



CHEMICAL RECONNAISSANCE VEHICLE



COMMAND VEHICLE



ATGM LAUNCHER

RECONNAISSANCE CAR

ANTIAIRCRAFT MISSILE LAUNCHER

RECOGNITION FEATURES: Four-wheeled, amphibious, armored reconnaissance vehicle; has full armored cover; has four small, rough terrain belly wheels that may be raised or lowered when needed.

EMPLOYMENT: As scout car in different variants; can mount Snapper, Swatter, or Sagger AT missiles. Two versions: basic BRDM has a 7.62-mm machinegun; BRDM-2 has a 14.5-mm machinegun.

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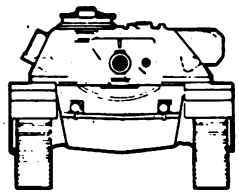
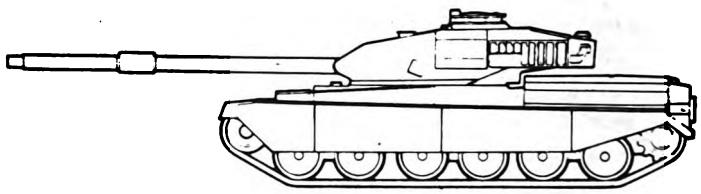
PERFORMANCE MEASURES (cont)

7. Friendly armor.

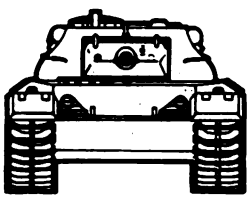
a. NATO nomenclature: Chieftain.

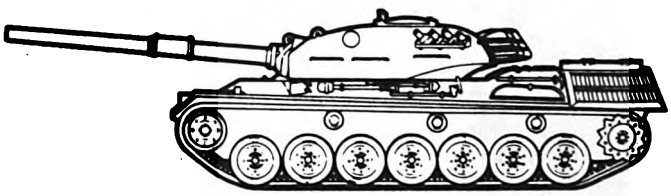




Chieftain Medium Tank (British). The Chieftain has six roadwheels (usually not visible due to armored track skirt). It has a flat, low-silhouette hull with a large, oval turret longitudinally centered over the fourth roadwheel. Its main gun has thermal covers and a bore evacuator one-fourth the way up the gun tube.

b. NATO nomenclature: Leopard I.





Leopard 1 medium tank (German). The Leopard has seven roadwheels. When modified, track skirts will cover return rollers. These tanks have sloped front armor, an elongated turret mounted forward of center, an engine plate in the rear that angles up from the turret, a bore evacuator mid-length of the main gun, and no muzzle brake.

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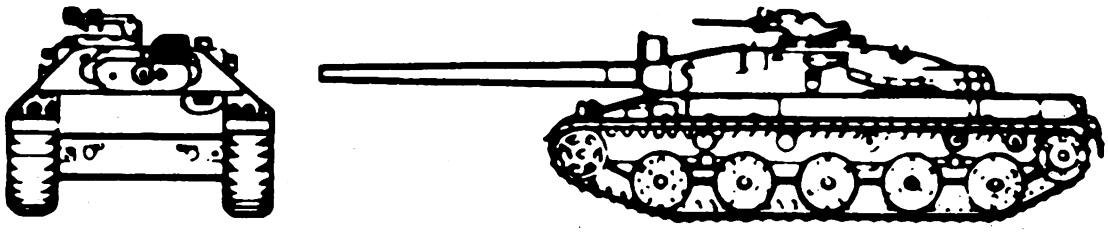
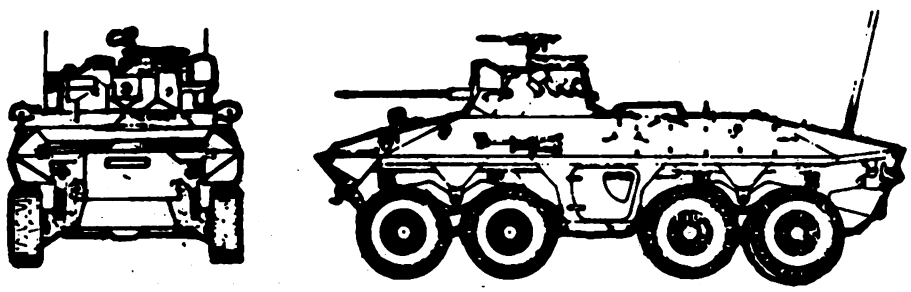
PERFORMANCE MEASURES (cont)

c. NATO nomenclature: AMX 30.



AMX 30 main battle tank (French). The AMX 30 has five roadwheels and a low silhouette. The gun tube has no muzzle brake or evacuator, but has a four-section aluminum heat shield. The AMX 30 has a streamlined turret with smoke grenade dispenser, and a square infrared/white light searchlight to the left of the main gun.

d. NATO nomenclature: Spahpanzer.



SPAHPANZER-2 (LUCHS) 8 x 8 armored reconnaissance vehicle (German). The LUCHS is an amphibious reconnaissance vehicle. It has eight roadwheels with a large gap between the second and thrid roadwheel. The LUCHS has sloping sides, long slopes at the front and rear, a round turret at the front over the second roadwheel, and two water propulsion propellers at the rear. It mounts a 20-mm cannon and a 7.62-mm antiaircraft machinegun.

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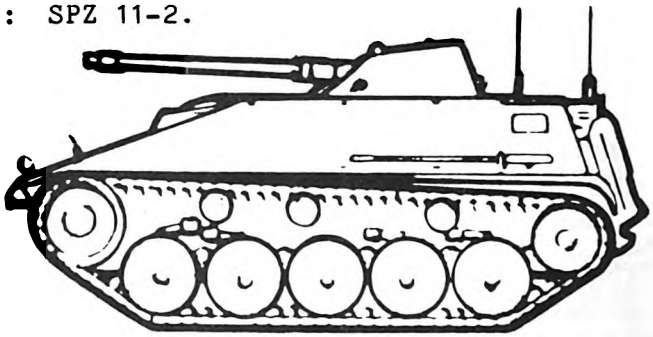
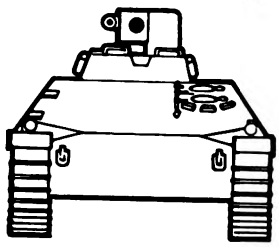
PERFORMANCE MEASURES (cont)

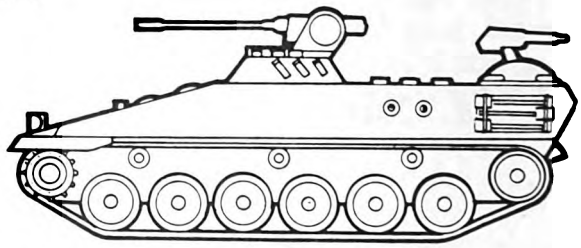
e. NATO nomenclature: SPZ 11-2.



Hotchkiss SPZ 11-2 tracked reconnaissance vehicle (French and German). The SPZ 11-2 has five roadwheels and three rollers. It has a sloped front with a basically square design. The turret is on the upper left of the vehicle and mounts a 20-mm cannon. The vehicle is not amphibious.

f. NATO nomenclature: Marder.





Marder mechanized infantry combat vehicle (German). The Marder has six roadwheels. A 20-mm cannon is mounted on a low, oval turret. The remote-controlled cupola at the center of the rear has a 7.62-mm machinegun.

REFERENCES

FM 71-1, Tank and Mechanized Infantry Company Team, chap 2, pp 2-1 thru 2-12.
TC 1-88, Aviator's Recognition Manual.
TC 30-3, Soviet Equipment Recognition Guide, pp 25 thru 44.
USAREUR Pam 30-60-1, Identification Guide.
USAARMS Pam, Comparative Characteristics of Main Battle Tanks.
TEC 935-171-0201-F, Armor Vehicle Recognition, Part I.
TEC 935-171-0202-F, Armor Vehicle Recognition, Part II.
TEC 935-171-0203-F, Armor Vehicle Recognition, Part III.

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IDENTIFY FRIENDLY AND THREAT AIRCRAFT

CONDITIONS

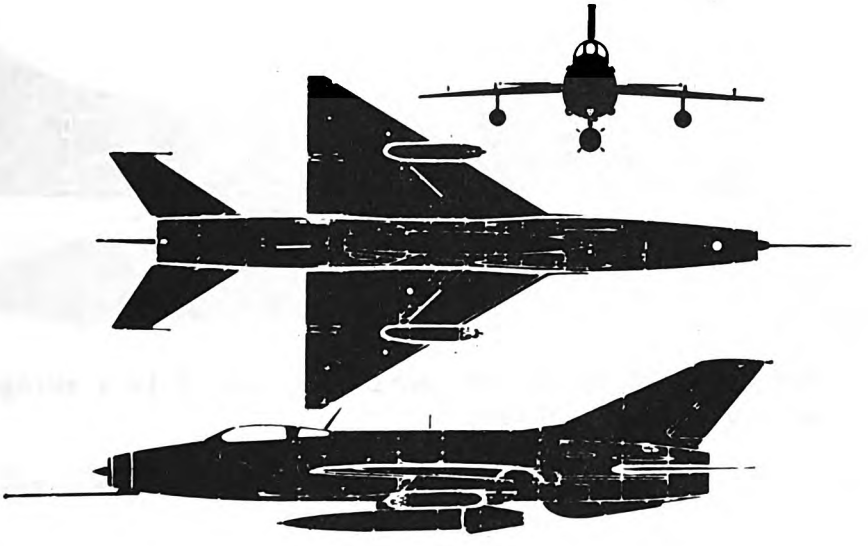
In a field environment with friendly and Threat aircraft flying overhead.

STANDARDS

Within 10 seconds, identify each aircraft as friendly or Threat with 90% accuracy.

PERFORMANCE MEASURES

1. Identify Threat aircraft.
2. Identify friendly aircraft.



The MiG-21 (NATO designation Fishbed) is a single-seat, clear-weather, jet fighter/interceptor aircraft.

Figure 1. MiG-21.

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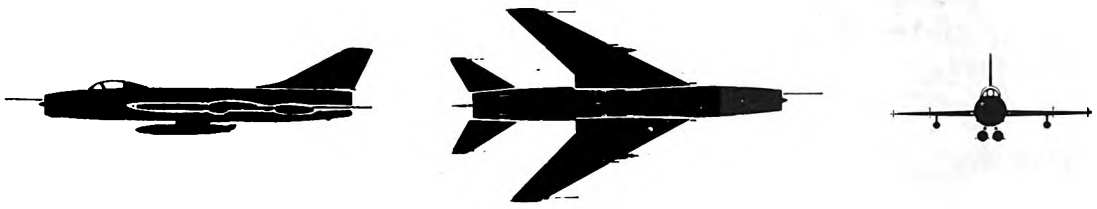
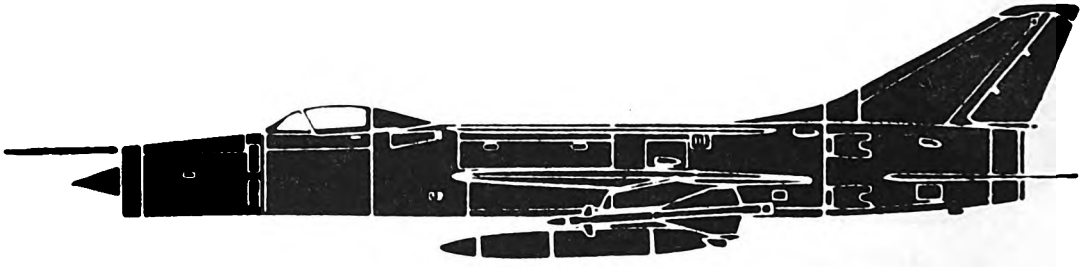
PERFORMANCE MEASURES (cont)



The Su-7 (NATO designation Fitter) is a single-seat, jet ground attack fighter.

Figure 2. Su-7.



The Su-17/20 (NATO designation Fitter C) is a swing-wing ground attack fighter.

Figure 3. Su-17/20.

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PERFORMANCE MEASURES (cont)

The Mi-4 (NATO designation Hound) is a light transport helicopter.

Figure 6. Mi-4.

The Mi-6 (NATO designation Hook) is a heavy transport helicopter.

Figure 7. Mi-6.

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PERFORMANCE MEASURES (cont)

The UH-1 Iroquois is a utility/administrative helicopter.

Figure 10. UH-1.

The AH-1 Huey Cobra is a heavily-armed attack helicopter.

Figure 11. AH-1.

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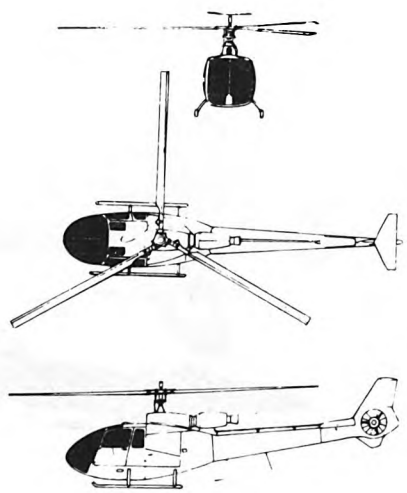
PERFORMANCE MEASURES (cont)

The Alouette III is a medium, seven-passenger/cargo helicopter.

Figure 12. Alouette III.



The Gazelle is a lightweight, multipurpose helicopter.

Figure 13. Gazelle.

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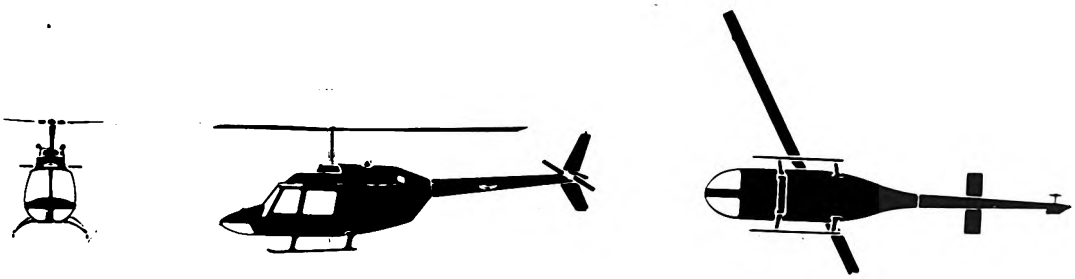
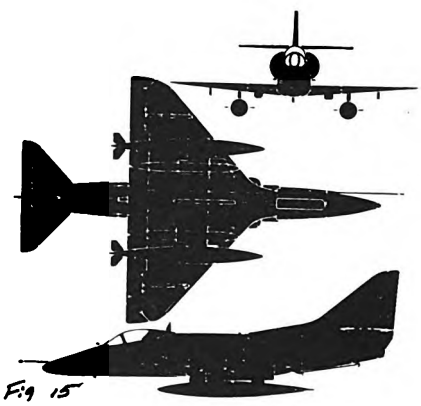
PERFORMANCE MEASURES (cont)



The OH-58 Kiowa is a light observation, armed reconnaissance, command helicopter.

Figure 14. OH-58.



The A4 Skyhawk is a small, carrier-based, jet attack bomber.

Figure 15. A4.

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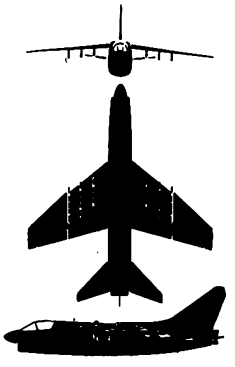
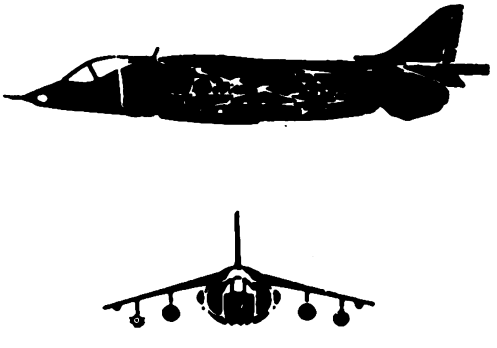
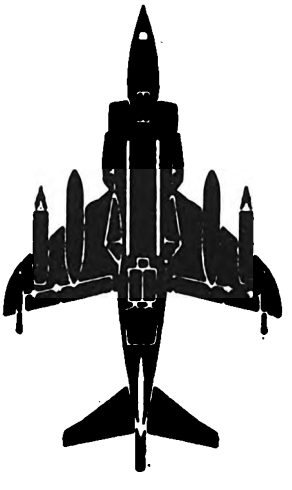
PERFORMANCE MEASURES (cont)



The A7 Corsair II is a single-seat tactical fighter/light attack bomber.

Figure 16. A7.





The AV-8 Harrier is a VSTOL fighter/ground attack aircraft.

Figure 17. AV-8.

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PERFORMANCE MEASURES (cont)

The F-4 Phantom II is an all-weather fighter/attack bomber.

Figure 18. F-4.

The F-5 Freedom Fighter is a tactical fighter aircraft.

Figure 19. F-5.

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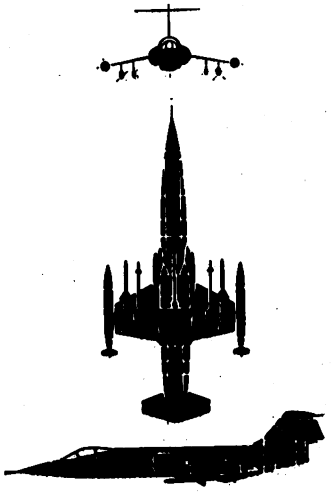
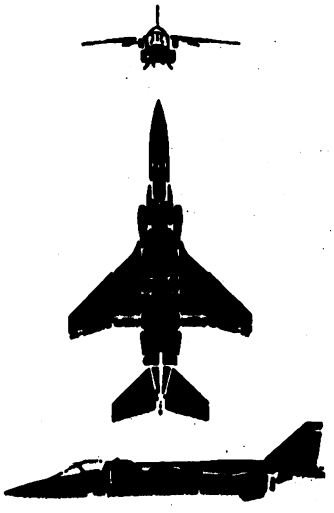
PERFORMANCE MEASURES (cont)



The F-104 Starfighter is the most widely used fighter/interceptor in the free world.

Figure 20. F-104.



The Jaguar is a ground attack fighter and trainer.

Figure 21. Jaguar.

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REFERENCES

FM 44-1, US Army Air Defense Artillery Employment, app A.
TC 1-88, Aviators Recognition Manual.
TC 44-30, Aircraft Recognition Training In Ground Observers.
GTA 44-2-1, Visual Aircraft Recognition.
GTA 44-1-A thru 44-1-0, Ground Observer Aircraft Recognition (GOAR) Kit.
GOAR (Ground Observer Aircraft Recognition) Kit.
TEC 954-441-0047-F, Wing, Engine, Fuselage, Tail (WEFT) Characteristics.
TEC 954-441-0049-F, Mirage III, F104, MiG-23/27, A-10, AV-8.
TEC 954-441-0050-F, OH-58, AH-1, Mi-6, Mi-4, UH-1.
TEC 954-441-0051-F, MiG-21, Jaguar, Su-17/20, MRCA, Su-19.
TEC 954-441-0052-F, Mi-24, Mi-8, C-130, AN-12, CH-47.
TEC 954-441-0053-F, Su-78, MiG-17, 1-4, I1-28, C-91.
TEC 954-441-0054-F, F-5, F-4, F-111, A-7, F-105.
TEC 954-441-0056-F, V-15, F-14, OV-10, Alouette III, Mirage F-1.
TEC 954-441-0057-F, SA 341, Scout, PUMA, LYNX, BO-105.
TEC 954-441-0058-F, Alpha Jet, F-16, OV-1, Buccaneer, A-6.
TEC 954-441-0059-F, SAAB-105, SAAB-37, YAK-28, Lightning Hunter.
TEC 954-441-0065-F, Self-evaluation, Part I.
TEC 954-441-0066-F, Self-evalution, Part II.

SQT ADMINISTRATION REQUIREMENTS

If visual aircraft recognition is tested during the hands-on or performance certification components of the SQT, you will be shown two consecutive views of 20 different aircraft from a GOAR kit. Each view will be presented for 5 seconds. You will then have 10 seconds to record your answer. You must correctly identify 18 of the 20 aircraft as friendly or Threat.

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CONDUCT SURVEILLANCE USING AN AN/TVS-4 NIGHT VISION SIGHT

CONDITIONS

At night given an AN/TVS-4 night vision sight and a sector of responsibility in a field environment.

STANDARDS

1. Within 15 minutes, the AN/TVS-4 must be operational.
2. You must detect all targets in your assigned sector.

   Note. Range is dependent on ambient light level (moon light or star light).

PERFORMANCE MEASURES

1. Place the AN/TVS-4 into operation.
   a. Place the carrying case on a flat surface.
   b. Open the pressure equilizer according to instructions on the warning plate, before releasing the carrying case latches to open the case.
   c. Release the carrying case latches and open the case.
   d. Check the contents of the case against the basic issue items to make sure the sight is complete.
   e. Place the rotary control switch in the OFF position and unscrew the battery cap.
   f. Insert the battery positive end first in the sight housing.
   g. Replace the battery cap.
   h. Open the legs of the tripod.
   i. Mount the sight onto the tripod with the mounting bracket on the tripod.
   j. Make sure the boresight cover is on the scope and place the rotary control switch to the on position. Listen to ensure the sight is operating properly.
2. Detect targets with the AN/TVS-4.
   a. Remove the boresight cover.

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PERFORMANCE MEASURES (cont)

b. Sight through the AN/TVS-4. Make sure your eye is placed firmly against the rubber eyeshield to prevent light leaks on the face.
c. Detect targets (see Task Summary 171-121-1008, Acquire and Identify Targets).

REFERENCES

TM 11-5850-228-13, Operator's Manual: Night Vision Sight, AN/TVS-4.
TC 23-13, Crew-Served Weapon, Night Vision Sight, p 4.

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PREPARE CAPTURED ENEMY DOCUMENTS AND MATERIEL FOR PROCESSING

CONDITIONS

Given captured documents or equipment, a tag for captured materiel, and a pencil.

STANDARDS

Within 3 minutes, complete each entry on the captured materiel tag. The tag must contain:

1. Type of document or equipment.
2. Date/time of capture.
3. Place of capture (grid coordinates).
4. Capturing unit.
5. Circumstances of capture (how it happened).

PERFORMANCE MEASURES

1. Prepare a captured materiel tag (fig 1) for each captured document or piece of equipment.

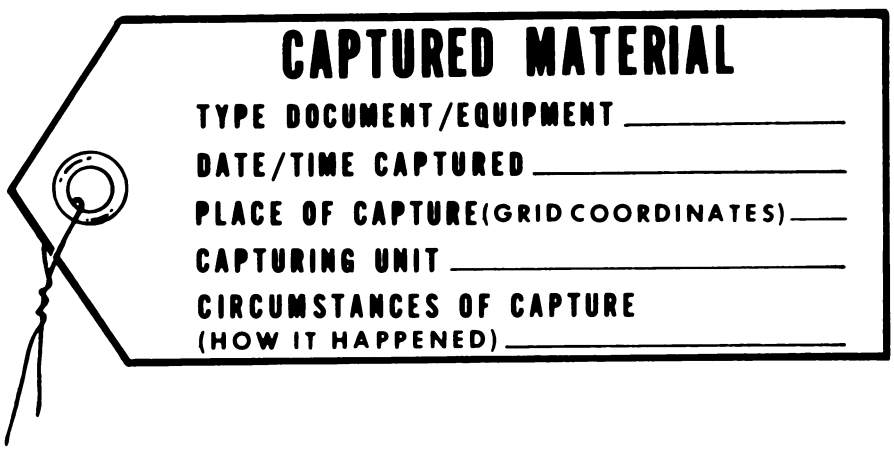

Figure 1.

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PERFORMANCE MEASURES (cont)

2. If the captured item was found on a prisoner, include this information on the tag so you know which prisoner had the item.

3. Send captured enemy documents or equipment to the next higher headquarters as soon as possible.

REFERENCES

FM 71-2, The Tank and Mechanized Infantry Battalion Task Force, app K, p K-3.

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PREPARE KNOWN OR SUSPECTED ENEMY PERSONNEL FOR PROCESSING

CONDITIONS

Given suspected enemy personnel.

STANDARDS

1. Without permitting the prisoners to talk with one another and without allowing anyone to harm them, search them and remove all weapons and documents except individual ID papers.

2. Tag prisoners and their equipment with your complete unit ID, date, time, and circumstances of capture.

3. Move the prisoners, their weapons, and captured documents to the collection point.

PERFORMANCE MEASURES

1. Search prisoners (fig 1) for weapons and documents as soon as you capture them. Take their weapons to prevent resistance and take documents, except individual identification papers, to prevent the prisoners from destroying them. Prisoners from whom personal property is taken, including personal documents, should be given a written receipt for the property. Tag the documents and other personal property so you know which prisoner had them. Allow prisoners to keep items needed for their general welfare or safety, such as a protective mask.

Figure 1. Search.

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PERFORMANCE MEASURES (cont)

2. Segregate prisoners into groups (fig 2): officers, non-commissioned officers, privates, deserters, civilians, females, and political indoctrination personnel. This prevents the leaders from organizing for a mass escape and from making the rest of the prisoners security-minded.

Figure 2. Segregate.

3. Silence the prisoners (fig 3). Do not allow prisoners to talk to each other. This helps to prevent plans of escape.

Figure 3. Silence.

4. Speed prisoners to the rear (fig 4). The information they have does no good until obtained by an interrogator and processed.

Figure 4. Speed.

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PERFORMANCE MEASURES (cont)

5. Safeguard the prisoners (fig 5) as you take them to the rear. Do not allow anyone to abuse them, but do not allow anyone to give them cigarettes, food, or water.

Figure 5. Safeguard.

REFERENCES

FM 21-75, Combat Training of the Individual Soldier and Patrolling, chap 4, p. 57.

TEC 935-071-1038-F, Intelligence #3, Processing Captured Personnel, Equipment, and Documents.

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DETERMINE RANGE TO TARGET

CONDITIONS

Given binoculars, a topographical map of the area of operation, and targets at ranges from 200 meters to 3,000 meters, during daylight and weather conditions in which all targets are visible.

STANDARDS

Within 20 seconds, determine the range to each target within ± 20% of the actual range.

PERFORMANCE MEASURES

1. Decide which method of range determination is most appropriate to the situation.

   a. Recognition method (table 1). Although this method is the fastest, it is the least accurate and will not meet the standard of accuracy indicated above. It may, however, be useful in conjunction with other methods of range estimation. The accuracy of the recognition method is also affected by target conditions shown in table 2.

RANGE DETERMINATION RECOGNITION METHOD	Naked Eye	Magnification 7-8 Power
	TARGET	METERS
Tank Crew Members Troops, Machinegun, Mortar, Antitank Gun, Antitank Missile Launchers	500	2,000
Tank, Armored Personnel Carrier, Truck, *by Model*	1,000	4,000
Tank, Howitzer, APC, Truck	1,500	5,000
Armored Vehicle, Wheel Vehicle	2,000	6,000

Table 1.

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PERFORMANCE MEASURES (cont)

TARGET CONDITION

SEEMS CLOSER	SEEMS FARTHER
● Bright clear day	● Fog, rain, hazy twilight
● Sun in front of target	● Sun behind target
● Higher elevations	● Lower elevations
● Large targets	● Small targets
● Bright colors- (white, red, yellow)	● Dark colors
● Contrast	● Camouflaged targets
● Looking across ravines, hollows, rivers, depression	
● At sea	

Table 2.

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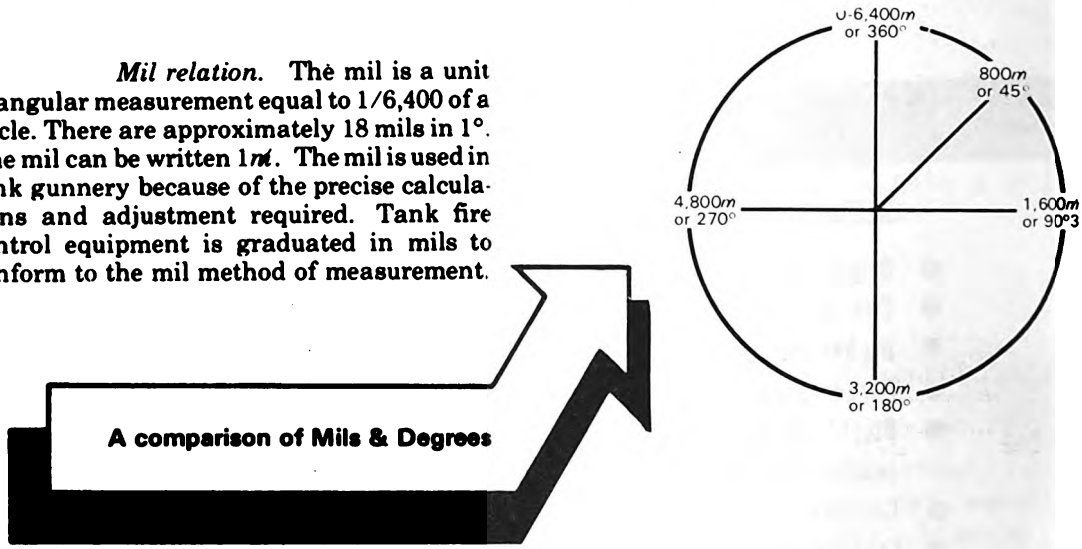
PERFORMANCE MEASURES (cont)

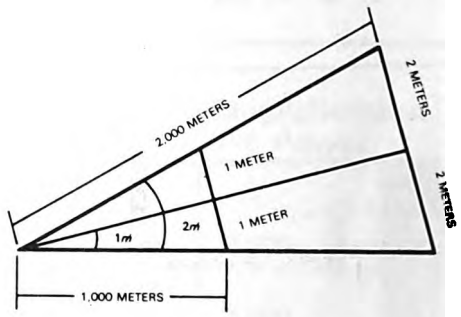
b. Sight reticle/mil relation method (fig 1). This method is accurate enough to meet accuracy standards. With practice, you can meet the time standard as well. The one drawback to the sight reticle/mil relation method is that you must know the width, length, or height of the target (fig 2).

Mil relation. The mil is a unit of angular measurement equal to 1/6,400 of a circle. There are approximately 18 mils in 1°. One mil can be written 1*m*. The mil is used in tank gunnery because of the precise calculations and adjustment required. Tank fire control equipment is graduated in mils to conform to the mil method of measurement.



One mil equals width (or height) of 1 meter at a range of 1,000 meters.

This relation is constant as the angle increases from 1 mil to 2 mils and the range increases from 1,000 meters to 2,000 meters. Because the mil relation is constant, other units of measure such as yards, feet, or inches can be substituted for meters in expressing width or range; however, the relation holds true only if *both* W and R are expressed in the same unit of measure. For example, if the sides of a 1-mil angle are extended to 1,000 *yards*, the width between the ends of the sides is 1 *yard*.



1 MIL AT 1,000 METERS EQUALS 1 METER.
1 MIL AT 2,000 METERS EQUALS 2 METERS.
2 MILS AT 1,000 METERS EQUALS 2 METERS.
2 MILS AT 2,000 METERS EQUALS 4 METERS.

Figure 1.

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PERFORMANCE MEASURES (cont)

c. Flash-bang method. Although this method will also meet the standards for time and accuracy, you must be able to see and hear the target weapon system fire. Additionally, since the velocity of the Threat main gun round is greater than the speed of sound, this method of range determination is impractical if the target weapon is firing at you (fig 3).

Flash-Bang. **In this technique range is determined by measuring the time between the flash and the gun report.**

Sound travels through the air at a fairly constant speed, about 330 meters per second. Comparatively, light travels in no time at all. Range can be determined if you can see *and hear* the action. For example, when you see the flash or smoke of a weapon, or the dust it raises, immediately start counting seconds. When you hear the weapon fire, stop and multiply the number of seconds by the constant, 330 meters. For example, if you stop counting at 3 seconds, the range is about 990 meters. Unfortunately, if the enemy is shooting *at* you, you may feel the impact of his round penetrating your tank before you hear the sound of his gun. ***(Remember sound travels at 330 meters per second. A T-62 tank round travels at 1,500 meters per second.)***

Figure 3.

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PERFORMANCE MEASURES (cont)

d. Map and graphic bar scale method. The accuracy and practicality of this method are dependent on your ability to quickly and accurately determine and plot your position and that of your target on the map. This method is particularly useful when sending a call for artillery or mortar fire on the target.

2. Once you have determined which method of range estimation is most practical for your situation, apply the procedures for determining the range using that method.

a. Recognition method. Although the target conditions in table 2 will have some effect on range estimation, the data in table 1 will generally hold true. For example, with the naked eye you should be able to identify armored and wheel vehicles from 1,500 to 2,000 meters. If you can positively identify the vehicle as a tank but can not determine the model, it is between 1,000 and 1,500 meters. As shown in table 1, seven to eight power magnification greatly increases the range at which you can identify your target.

b. Sight reticle/mil relation method.

(1) Determine the width, length, or height of the target in mils using your binocular reticle (figs 2 and 4).

(2) Using the known width, length, or height in meters and measured mil value (step (1) above), determine the range by using the formula $R = \frac{W}{m}$ (fig 4). Table 3 shows the computations for targets at various ranges.

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PERFORMANCE MEASURES (cont)

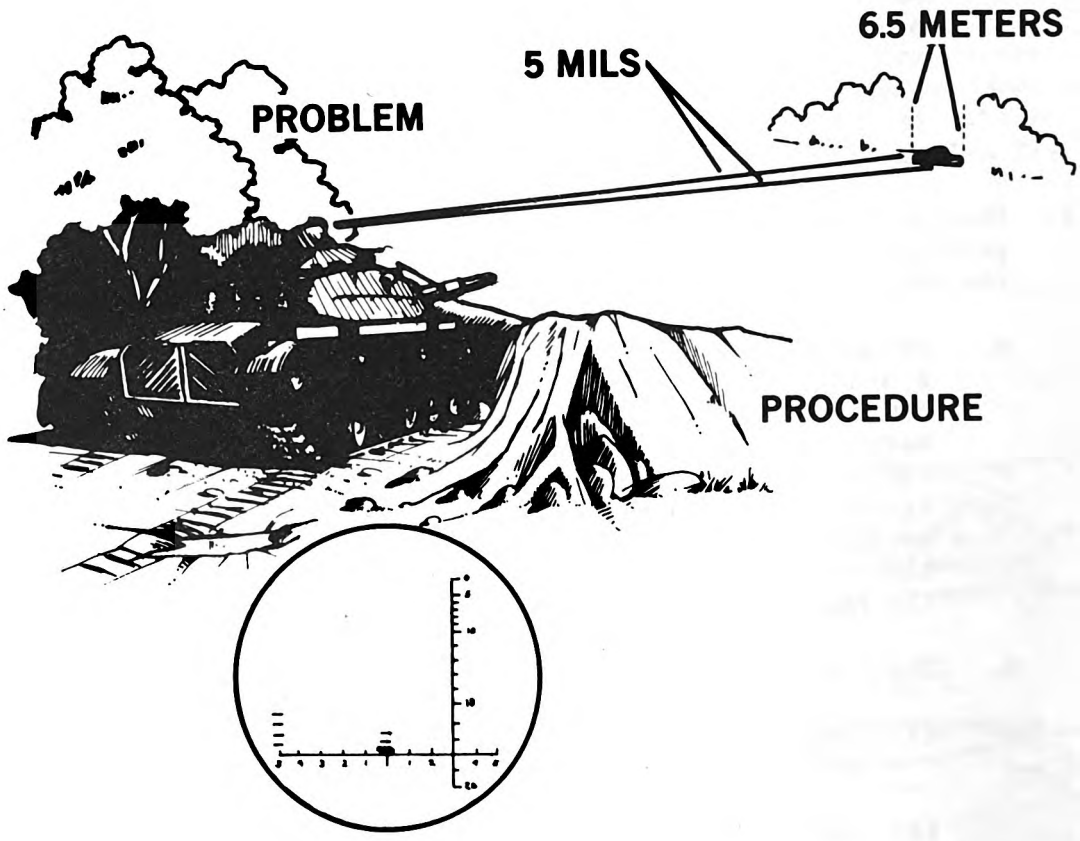

Figure 4.

MIL ANGLE MEASUREMENT		RANGE	1	2	3	4	5	6	7	8	9	10
Threat Medium Tank	Length: 6.5 meters		6,500	3,300	2,200	1,600	1,300	1,100	900	800	700	700
	Width: 3.5 meters		3,500	1,800	1,200	900	700	600	500	400	400	400
Threat Heavy Tank	Length: 7.5 meters		7,500	3,800	2,500	1,900	1,500	1,300	1,100	900	800	800
	Width: 3.5 meters		3,500	1,800	1,200	900	700	600	500	400	400	400

Table 3.

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PERFORMANCE MEASURES (cont)

c. Flash-bang method (fig 3).

(1) Observe the flash of the target weapon firing.

(2) Count the number of seconds until you hear the weapon fire. This time interval may be measured on a watch, if available, or by estimation, using a steady count such as, "ONE-THOUSAND-ONE, ONE-THOUSAND-TWO, ONE-THOUSAND-THREE," for a 3 second count. If you must count higher than 10 seconds, start over at one.

(3) Multiply the number of seconds by 330 meters, to get the approximate range from the target weapon to your position.

d. Map and graphic bar scale method (see Task Summary 071-329-1008, Measure Distance on a Map).

(1) Determine and plot your position on the map.

(2) Determine and plot the position of the target on the map.

(3) Determine the straight line distance (see Task Summary 071-329-1008).

REFERENCES

FM 17-12, Tank Gunnery, pp 7-2 thru 7-10.
FM 21-26, Map Reading, p 4-2.
FM 21-75, Combat Training of the Individual Soldier and Patrolling, p 12.

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OCCUPY A CAVALRY (M113A1) POSITION

CONDITIONS

In a tactical environment, given a crew mounted in an M113A1 and a directive from the section leader or vehicle commander to occupy the next designated firing position. (The designated position will be general; for example, a hill mass.)

STANDARDS

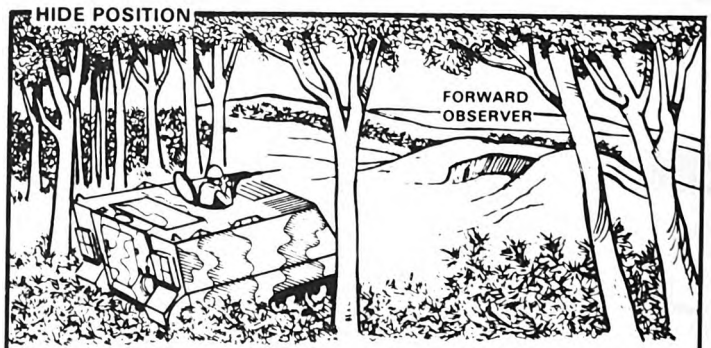
Position the vehicle for firing as directed by the section leader or vehicle commander and in accordance with the performance measures below.

PERFORMANCE MEASURES

Note. The vehicle commander has the responsibility for selecting positions which offer the best cover, concealment, and fields of fire available. As the driver you should be knowledgeable of the various types of positions which the vehicle commander may direct you to occupy.

1. The tactical positions for APCs are:

   a. Hide. The vehicle is completely covered and concealed. Fields of fire are not available to the caliber .50 machine-gun or DRAGON (fig 1).



A completely covered and concealed position from which the vehicle must move to shoot.

Figure 1.

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PERFORMANCE MEASURES (cont)

b. Hull-down. The vehicle is covered from the enemy, but clear fields of fire are available for either the machinegun or DRAGON (fig 2).

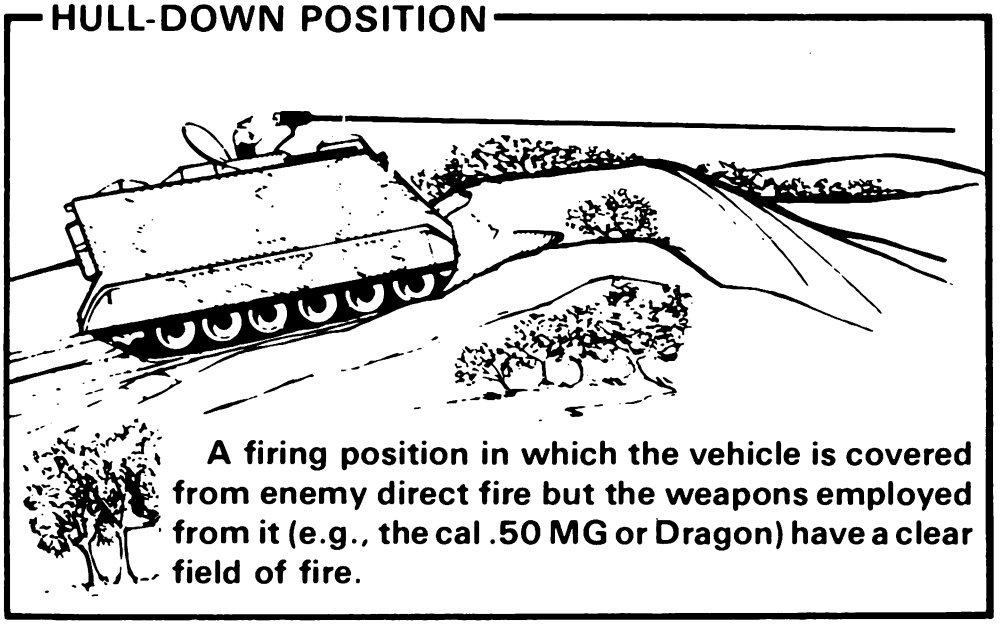
HULL-DOWN POSITION
A firing position in which the vehicle is covered from enemy direct fire but the weapons employed from it (e.g., the cal .50 MG or Dragon) have a clear field of fire.

Figure 2.

c. Ideally, targets should be engaged from hull-down firing positions. However, if a hull-down position is not available, the APC should occupy a hide position with an observer placed forward. When a target approaches, the APC is quickly moved to a firing position from which it can best shoot the target. After firing, the APC may quickly move to an alternate or hide position to evade counterfire (fig 3).

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PERFORMANCE MEASURES (cont)

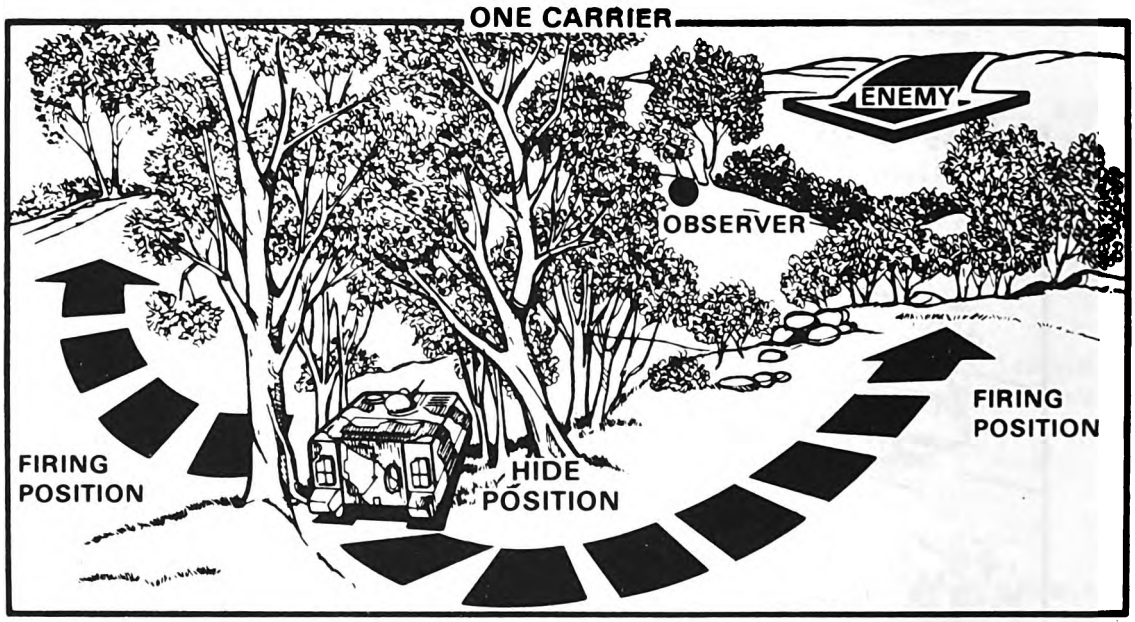

Figure 3.

2. Movement to occupy a position. Once the vehicle commander has designated the general position area, you have to maneuver your vehicle to that area. Some of the things you need to keep in mind are (fig 4):

   a. Be careful not to destroy camouflage when moving into the area.

   b. Take advantage of all cover and concealment available.

   c. Remove or camouflage track marks to decrease the chance of detection by aerial observation.

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PERFORMANCE MEASURES (cont)

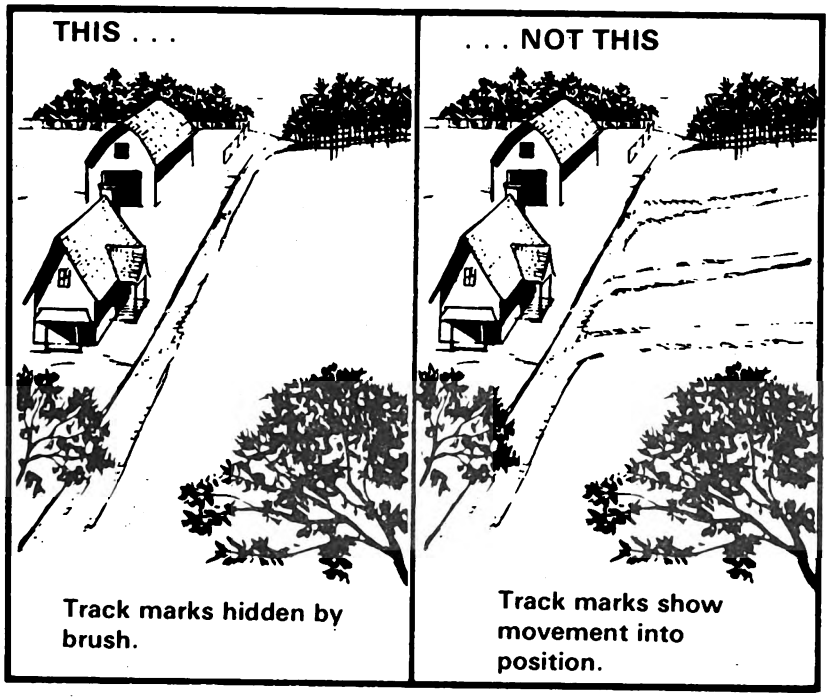

Figure 4.

REFERENCES

FM 7-7, The Mechanized Infantry Platoon and Squad, chap 5, pp 5-17 and 5-22.
FM 17-12, Tank Gunnery, chap 8, pp 8-1 thru 8-10 and chap 11, pp 11-7 thru 11-8.
FM 71-1, Tank and Mechanized Infantry Company Team, app Q, pp Q-18 and Q-19.

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ACQUIRE TARGETS

CONDITIONS

In a field environment with or without optics, given friendly and enemy targets with or without camouflage at various ranges and positions surrounding your location.

STANDARDS

Detect and locate each target within your sector and identify each as friendly or enemy within 10 seconds during daylight and 15 seconds at night.

PERFORMANCE MEASURES

1. Detect and locate friendly and enemy targets.

    a. Continuously scan your assigned area of responsibility (fig 1). Without optics, make a quick overall search for obvious targets using all your senses to detect tell-tale target signatures. Concentrate on areas where targets are most likely to be employed.

        (1) Soldier signatures -- foxholes, trash, torn out vegetation used for camouflage, fires, and odors such as cooking food, burning tobacco, or aftershave lotion.

        (2) Track vehicle signatures -- tank tracks on the ground, track and engine noise, dust clouds, fuel smoke and odor, white puff of smoke followed by a loud sharp report, and a bright white flash at night. Look for these signatures in open areas and rolling terrain.

        (3) Antitank signatures -- swishing sound of missile launch, long thin wires from previously fired ATGMs, tracers of slow flying ATGMs, sharp crack of antitank guns, and dismounted gunner up to 80m away from the launching rail. Look for antitank employment in open areas where tanks are likely to be used.

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PERFORMANCE MEASURES (cont)

(4) Artillery signatures -- loud, dull report; grayish white cloud of smoke; bright orange flash; black smoke from airbursts; and a rushing noise heard several seconds before impact of the round.

(5) Aircraft signatures -- aircraft noise, glare of sun from aircraft canopies and rotor blades, vapor trails from aircraft or fired missiles, and dust and movement of foliage from hovering helicopters. Look for these signatures where terrain masks such as ridges or forests are available for aircraft to hide behind.

(6) Obstacle and mine signatures -- loose or disturbed dirt in a regular pattern. Look for positions between uncrossable terrain features and areas covered by enemy fire (usually infantry with antitank weapons).

b. With the aid of optics, make a more detailed search of your area of responsibility using the 50-meter method to locate specific targets.

(1) Search a strip 50 meters deep from right to left.

(2) Search another strip from left to right farther out, overlapping the first strip.

(3) Continue this method until the entire sector is covered.

(4) When a suspicious spot is detected, stop and search it thoroughly.

c. To locate suspected enemy air targets, start by searching from far to near.

d. Use optics whenever suspected targets are too far away to identify with the naked eye or when buttoned up in a vehicle. Binocular efficiency can be improved by using only one eyepiece or cupping the eyepiece with your hands to prevent stray light from entering your eyes.

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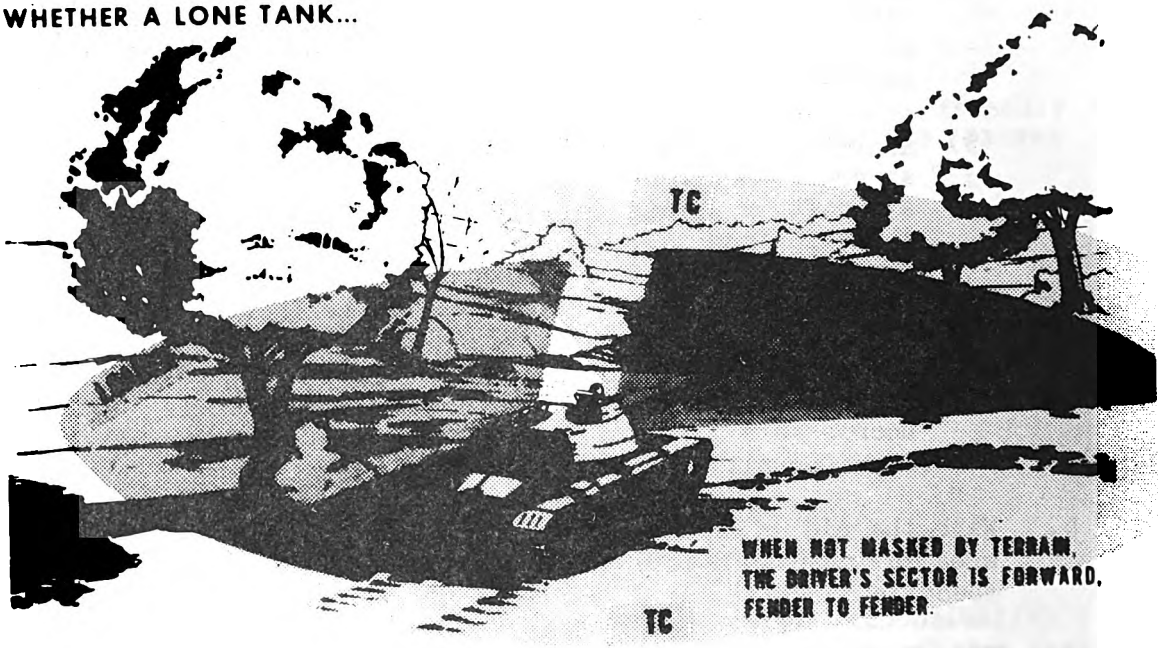
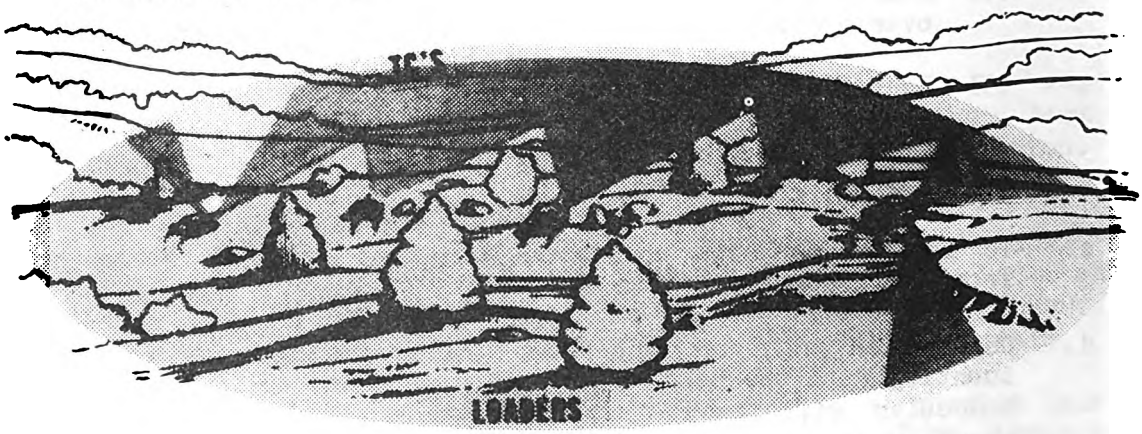
PERFORMANCE MEASURES (cont)

WHETHER A LONE TANK...



OR WITH THE PLATOON.



A dismounted observer equipped with binoculars and communications to the tank can provide highly effective target acquisition information. He is more apt to hear the enemy before he sees him.

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PERFORMANCE MEASURES (cont)

e. Detect and locate targets at night using the same techniques described above; however, do not look directly at a suspected target but a few degrees off to the side since the sides of your eyes are more sensitive to dim light and movement. When scanning with this off-center vision, move your eyes in short, abrupt, irregular movements. When using optics at night, use a dim reticle or none at all to improve night observation.

2. Identify the target as friendly or enemy (see Task Summaries 071-331-0814, Identify Friendly and Threat Vehicles, and 171-091-1015, Identify Friendly and Threat Aircraft).

3. Identify the degree of danger presented by each target and engage the most dangerous first.

   a. Most dangerous targets are those that see you, have the capability of killing you, and appear to be preparing to engage you.

   b. Dangerous targets are those that can kill you, but apparently do not see you.

   c. Least dangerous targets are those that do not have the immediate capability of killing you, but can report your position to someone who is capable of killing you.

4. Report the acquisition of a target or targets to your supervisor or vehicle commander.

REFERENCES

FM 17-12, Tank Gunnery, pp 6-1 thru 6-9.

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CALL FOR AND ADJUST INDIRECT FIRE

CONDITIONS

Given a 1:50,000 map, a compass, binoculars, a radio, and a target.

STANDARDS

1. The initial request for fire must be made within 3 minutes after the target has been designated.
2. Each adjustment must be made within 30 seconds after the round(s) impacts.
3. Round must impact within 50m of the target within five adjustments.

PERFORMANCE MEASURES

1. Formulate and make an initial request for fire.
   a. Locate the target.
   b. Determine magnetic azimuth to the target.
   c. Determine the target's grid coordinates.
   d. Transmit a call for fire to the fire direction center (FDC) on the FDC net, giving:
      (1) Observer identification.
      (2) Warning order. Example: K06 THIS IS K05--ADJUST FIRE--OVER. Elements 1 and 2 are transmitted together.
      (3) Location of target. Example: GRID 502347--OVER.
      (4) Description of target (number, type, and activity). Example: INFANTRY COMPANY DIGGING IN ALONG WOODLINE--OVER.
      (5) Method of engagement (optional).

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PERFORMANCE MEASURES (cont)

(a) Specify DANGER CLOSE if target is within 600m when using artillery, or 400m when using 4.2-inch mortars.

(b) Specify ammunition fuze if a requirement exists for special ammunition or fuze. Examples: SMOKE or HE-DELAY.

(6) Method of fire and control (optional). Example: PLATOON RIGHT or PLATOON LEFT. Control examples: AT MY COMMAND, CANNOT OBSERVE, TIME ON TARGET _____ MINUTES FROM NOW, or TIME ON TARGET 0347.

2. Adjust fire onto the target.

a. Direction (given with correction). Examples: DIRECTION 2800, 120° MAGNETIC, NORTH, or SOUTHEAST.

b. Sense each round as right/left for deviation, over/short for range. Examples: OVER--RIGHT or SHORT--RIGHT.

c. Deviation correction (fig 1).

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PERFORMANCE MEASURES (cont)

The observer brings burst onto observer target (OT) line by multiplying mils of deviation by the OT factor.

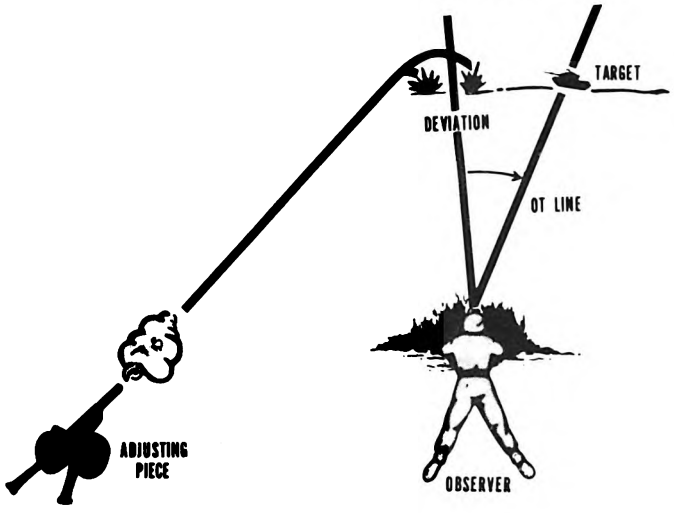

Figure 1.

The OT factor is the OT distance in thousands of meters. If the OT distance is 1,000 meters or greater, the OT factor is expressed to the nearest thousand. If the OT distance is less than 1,000 meters, the OT factor is expressed to the nearest hundred. The following are examples of computations of deviation corrections:

OT distance	OT factor	Spotting	Deviation Correction
3600	4	40 RIGHT	LEFT 160 (40x4)
3400	3	50 LEFT	RIGHT 150 (50x3)
800	0.8	40 LEFT	RIGHT 30 (40x0.8)

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PERFORMANCE MEASURES (cont)

(3) Continue to split the bracket until a 100m bracket is split, then call for fire for effect.

REFERENCES

FM 6-30, The Field Artillery Observer.
FM 6-40, Field Artillery Cannon Gunnery, chap 10, pp 10-4 thru 10-6.
FM 6-40-5, Modern Battlefield Cannon Gunnery, pp 5-3 thru 5-8 and 6-3.
FM 23-91, Mortar Gunnery, p 4-2.
TC 6-40-4, Fire for Effect.
TEC 949-061-0001F, Determination of Direction.
TEC 949-061-0002F, Target Location: Polor Plot, Grid Coordinates.
TEC 949-061-0003F, Locate a Target by Shift from a Known Point.
TEC 949-061-0004F, The Call for Fire.
TEC 949-061-0005F, Adjustment of Field Artillery Fire Bracketing and Creeping, Part 1.
TEC 949-061-0006F, Adjustment of Field Artillery Fire Bracketing and Creeping, Part 2.

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PERFORM OPERATOR MAINTENANCE ON AN M16A1 RIFLE, MAGAZINE, AND AMMUNITION

CONDITIONS

Given an M16A1 rifle, a magazine, 5.56-mm ammunition (combat only), and a small arms maintenance equipment case (FSN 8465-00-781-9564).

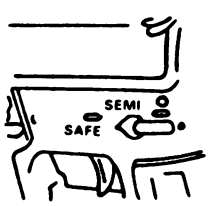
STANDARDS

1. Disassemble an M16A1 rifle in accordance with the performance measures for disassembly.
2. Clean and lubricate an M16A1 rifle in accordance with the performance measures for cleaning and lubricating.
3. Assemble an M16A1 rifle in accordance with the performance measures for assembly, and conduct a function check.
4. Disassemble, clean and lubricate, then assemble the rifle magazine in accordance with the performance measures for care of the rifle magazines.

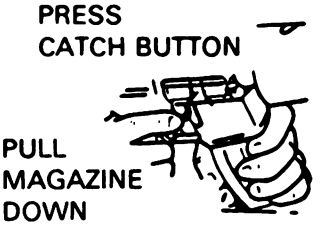
PERFORMANCE MEASURES

1. Clear your rifle (fig 1).

1 Place selector on SAFE. If weapon is not cocked, lever cannot be pointed toward SAFE.



2 Remove magazine.



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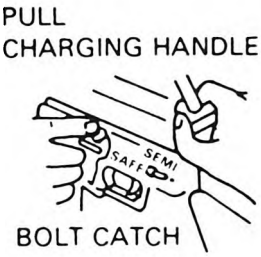
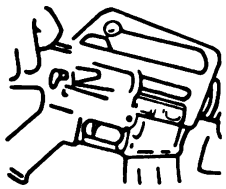
PERFORMANCE MEASURES (cont)

3 To lock bolt open, pull charging handle rearward, press bottom of bolt catch, allow bolt to move forward until it engages bolt catch. Return charging handle to forward. If you haven't before, place on SAFE.



4 Eyeball receiver and chamber to insure these areas contain no ammo.



5 With selector lever pointing toward SAFE, allow bolt to go forward by pressing upper portion of bolt catch.

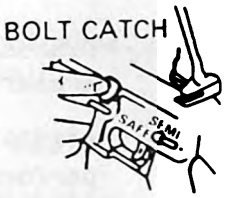


Figure 1.

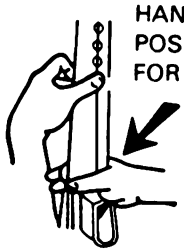
2. Disassemble your rifle (fig 2).

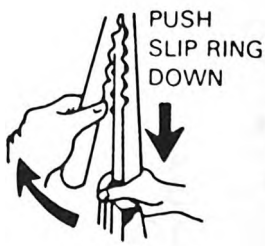
1 **first CLEAR YOUR RIFLE**

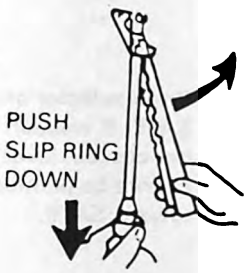
2 Remove sling.

NOTE

Remove & clean only if dirt & corrosion can be seen through vent holes.







3 Remove handguards.

Figure 2.

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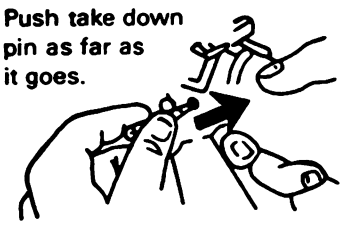
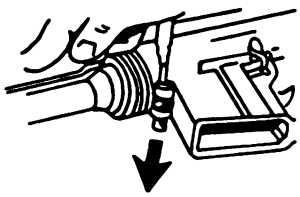
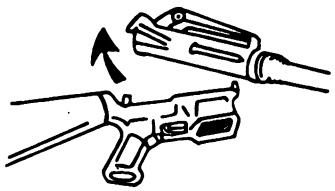
PERFORMANCE MEASURES (cont)



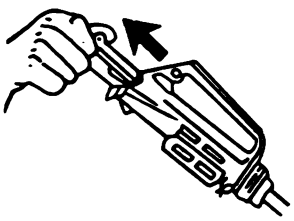
4 Pivot upper receiver from lower receiver.



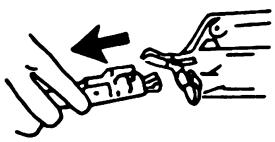
5 Push receiver pivot pin.



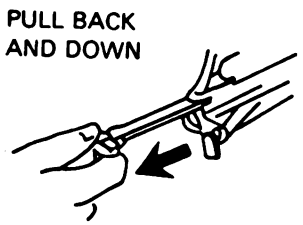
6 Separate upper and lower receivers.



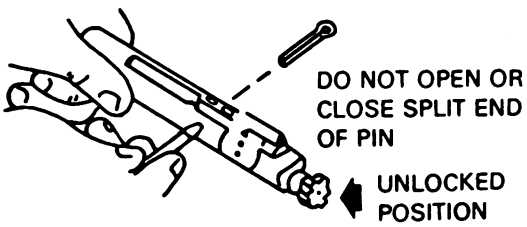
7 Pull back charging handle and bolt carrier.



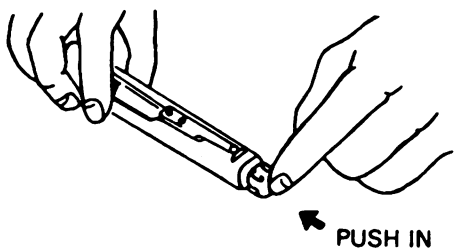
8 Remove bolt carrier and bolt.



9 Remove charging handle.

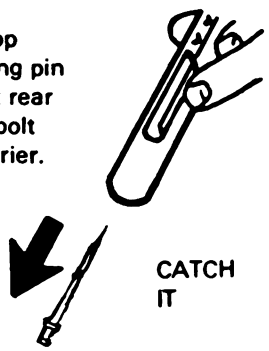


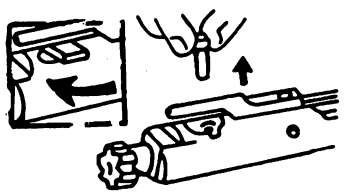
10 Remove firing pin retaining pin.



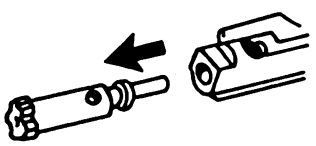
11 Put bolt assembly in lock position.

12 Drop firing pin out rear of bolt carrier.





13 Remove bolt cam pin.



14 Remove bolt assembly from carrier.

Figure 2 (cont).

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PERFORMANCE MEASURES (cont)

3. Perform steps 15 thru 18 only when your rifle is dirty or damaged (fig 3).

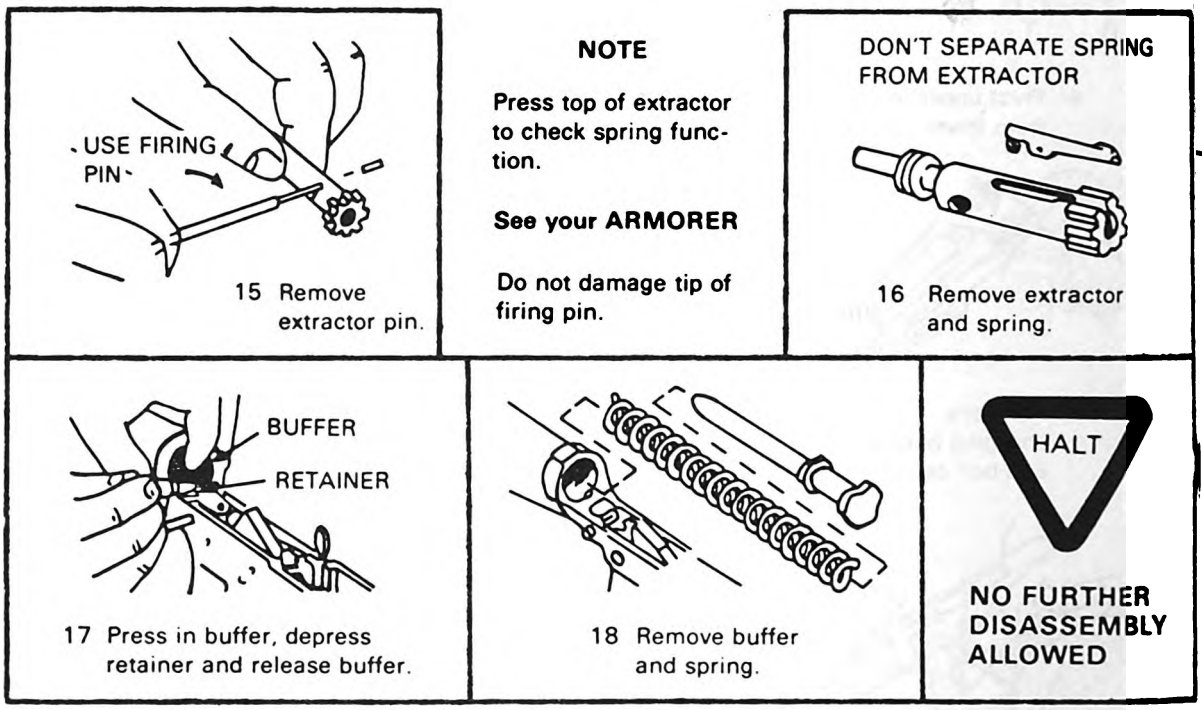
USE FIRING PIN
15 Remove extractor pin.
NOTE
Press top of extractor to check spring function.
See your ARMORER
Do not damage tip of firing pin.
DON'T SEPARATE SPRING FROM EXTRACTOR
16 Remove extractor and spring.
BUFFER
RETAINER
17 Press in buffer, depress retainer and release buffer.
18 Remove buffer and spring.
HALT
NO FURTHER DISASSEMBLY ALLOWED

Figure 3.

4. Clean, inspect, and lube your rifle (fig 5 and 6).

   a. With the rifle disassembled, thoroughly clean, inspect and lube it, so you have a reliable weapon you can always depend on.

   b. After firing, clean your weapon for 3 consecutive days with rifle bore cleaner (RBC). Wipe dry and lube according to the lubrication instructions.

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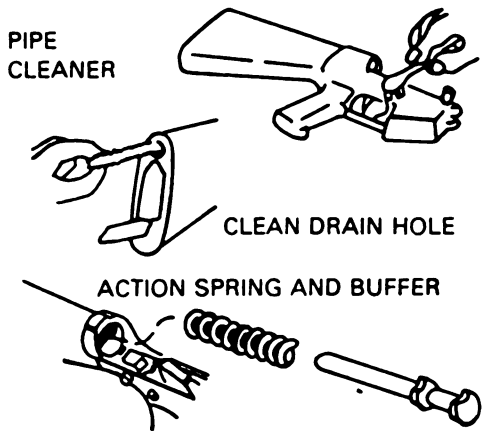
PERFORMANCE MEASURES (cont)

- All Areas of Powder Fouling, Corrosion, and Dirt
- Wipe Dirt from Trigger Mechanism
- Clean Buffer and Inside Lower Receiver Extension

CAUTION
Do not use wire brush or any type of abrasive material to clean aluminum surfaces



CLEANING bolt carrier group

- Outer & Inner Surfaces of Bolt Carrier
- Carrier Key
- Firing Pin Recess and Firing Pin
- Firing Pin Hole (Use Pipe Cleaner There)
- Carbon Deposits & Dirt from Locking Lugs
- Areas Behind Bolt Ring and Under Lip of Extractor

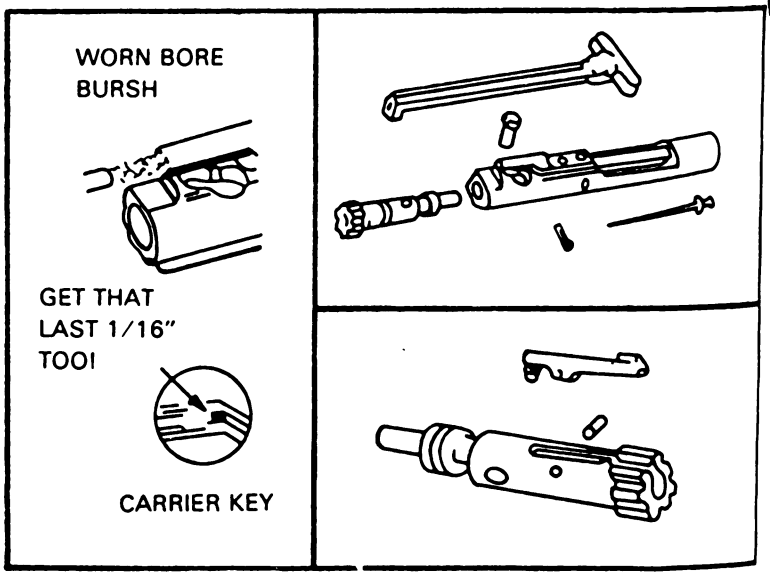


Figure 5.

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PERFORMANCE MEASURES (cont)

LUBE GUIDE:

Under all but the coldest arctic conditions, LSA is the lubricant to use on your fifle. Remember to remove excessive oil from the bore before firing.

Lightly Lube--A film of oil barely visible to the eye.

Generously Lube--Heavy enough so that it can be spread with the finger.

5. Lubricating your rifle. Clean and lightly lubricate with LSA the lugs in the barrel extension, bore, and chamber. Clean and lightly lubricate the bolt carrier. Lubricate the slide cam pin area, piston rings, outside bolt body, and in bolt carrier key.

   CAUTION: Apply only a light coat of LSA to the firing pin and firing pin recess.

   Use rifle bore cleaning compound (RBC) to clean powder fouling in the upper receiver. Clean the outside surface of the protruding gas tube with a worn bore brush. Coat all other surfaces with lubricant. Apply a light coat of LSA to the buffer, action spring, and inner surfaces of the lower receiver extension. Use a generous amount inside the lower receiver and on all components.

6. Inspect - before assembly (see fig 6).

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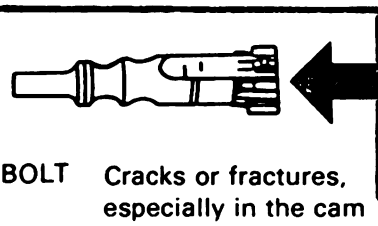
PERFORMANCE MEASURES (cont)

WARNING: DO NOT interchange bolts between rifles



BOLT Cracks or fractures, especially in the cam pin hole area. Bolts that contain pits extending into the firing pin hole need replacing

FIRING PIN - Bent, cracked or blunted end

FIRING PIN RETAINING PIN - Bent, busted, badly worn

CAM PIN - Cracked, chipped or missing

EXTRACTOR AND EXTRACTOR SPRING - Check extractor for chipped or broken edges in the area of the lip that engages the cartridge rim.

IF PARTS ARE MISSING OR DEFECTIVE, SEE YOUR ARMORER

Figure 6.

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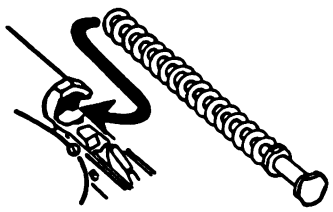
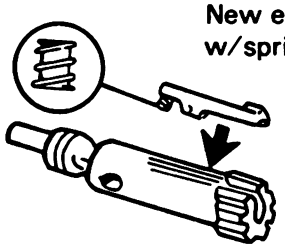
PERFORMANCE MEASURES (cont)

7. Assemble your rifle (fig 7).

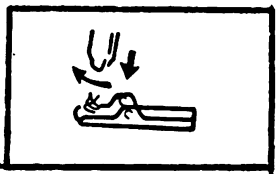


1 Insert spring and buffer

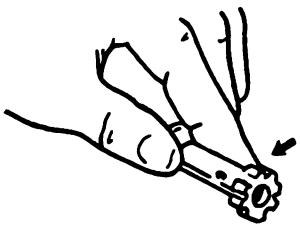


New extractor has a silicone insert w/spring. Be sure not to lose it

If the spring comes loose, put the large end of spring in the extractor and seat

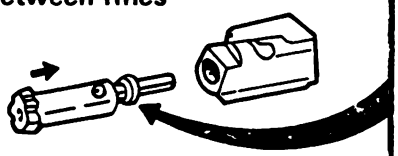


2 Insert extractor and spring



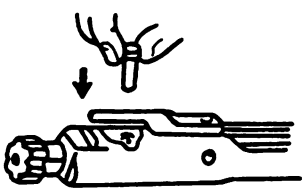
3 Push in extractor pin

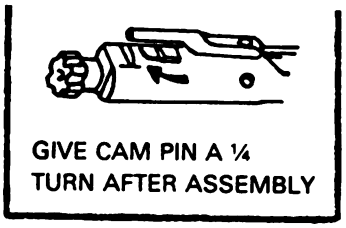
WARNING
Don't switch bolts between rifles



4 Slide bolt into carrier

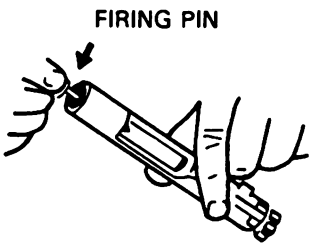
STAGGER RING GAPS TO STOP GAS LOSS





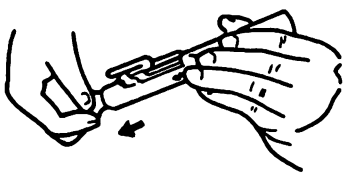
GIVE CAM PIN A ¼ TURN AFTER ASSEMBLY

5 Replace bolt cam pin

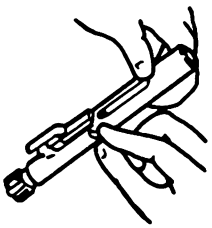


FIRING PIN

6 Drop in and seat



7 Pull bolt back



8 Replace retaining pin

NOTE

Firing pin should not fall out when bolt carrier group is turned upside down

Figure 7.

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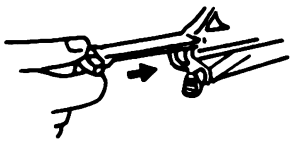
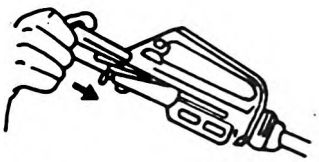
PERFORMANCE MEASURES (cont)



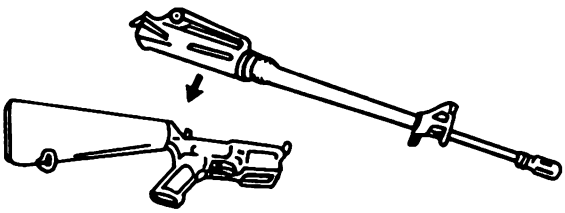
9 Engage, then push charging handle part way

BE SURE BOLT IS STILL UNLOCKED

10 Slide in bolt carrier group



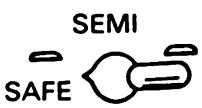
11 Push in charging handle and bolt carrier group together

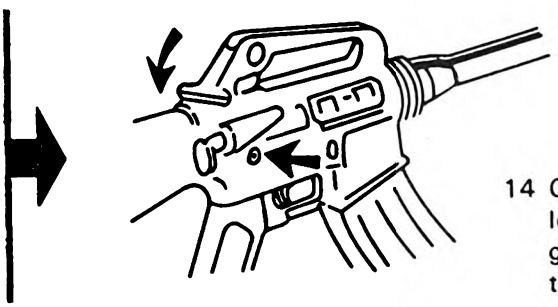


12 Join upper and lower receivers

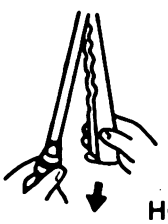
13 Engage receiver pivot pin

CAUTION:
Selector lever must be on safe or semi before closing upper receiver

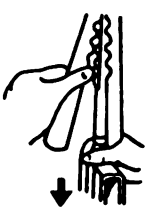




14 Close upper and lower receiver groups. Push in takedown pin



HOLD SLIP RING DOWN



RELEASE SLIP RING

CHECK FOR FULL ENGAGEMENT

15 PUT HANDGUARDS IN PLACE

16 Replace sling

Figure 7 (cont).

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PERFORMANCE MEASURES (cont)

8. Disassemble the magazine (fig 8).

20 RD MAG PUSH DOWN ON INTERNAL SPRING AND SLIDE OUT

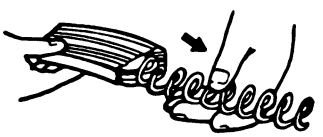
Release base catch

30 RD MAG PRY UP. PUSH OUT

Release base catch

Remove base

Jiggle spring and follower to remove



NOTE:
Do not remove follower from spring

Figure 8.

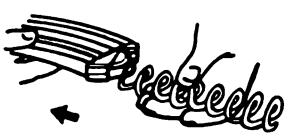
9. Assemble the magazine (fig 9).

IF THE SPRING COMES LOOSE FROM THE FOLLOWER, TURN IN THE PIECES DON'T TRY TO FIX IT YOUR SELF

CLEAN & LUBE

Wipe dirt from tube, spring, and follower, then lightly lube spring

Jiggle spring and follower to install



Slide the base under all four tabs

MAKE SURE PRINTING IS ON THE OUTSIDE

Figure 9.

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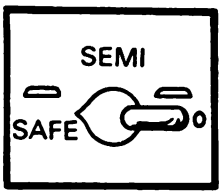
PERFORMANCE MEASURES (cont)

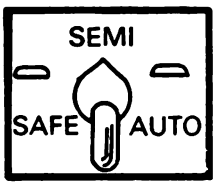
10. Perform a functional check (fig 10).

(REMOVE MAG . . . CHECK CHAMBER)



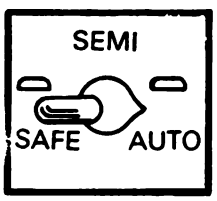
SELECTOR LEVER ON: *safe*

Pull charging handle to rear and release. Place on safe. Pull trigger. Hammer should not fall.



semi

Place selector in semi. Pull trigger and hold to rear. Hammer should fall. Pull charging handle to rear and release. Release trigger and pull again. Hammer should fall.



auto

Place selector in auto. Pull charging handle to rear and release. Pull trigger and hold to rear, hammer should fall. Pull charging handle to rear and release. Release trigger and pull again. Hammer should not fall.

Figure 10.

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PERFORMANCE MEASURES (cont)

REFERENCES

TM 9-1005-249-10, Operator's Manual; M16A1 Rifle, pp 9 thru 33.
TEC 939-071-0010-F, Disassembly and Assembly of the M16A1 Rifle.
TEC 939-071-0022-F, Maintaining the M16A1 Rifle GTA 21-13, M16/M16A1 Rifle Maintenance Card.

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LOAD, REDUCE A STOPPAGE, AND CLEAR AN M16A1 RIFLE

CONDITIONS

Given an assembled and operational M16A1 rifle, a magazine loaded with either live or blank ammunition. Performance of this task with blank ammunition can be accomplished either in garrison or in the field. Live firing requirements are only applicable to actual combat situations or range firing.

STANDARDS

In accordance with the performance measures:

1. Load and chamber a round within 5 seconds.
2. Eliminate stoppages, either real or simulated, within 10 seconds, by using immediate action.
3. Clear the M16A1 rifle within 10 seconds.

PERFORMANCE MEASURES

1. Load a round (fig 1).

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PERFORMANCE MEASURES (cont)

3. Immediate action (fig 3).

Note. If your rifle stops firing before you do, remember: S-P-O-R-T-S. That key word will help you remember the following actions: Slap, Pull, Observe, Release, Tap, Shoot.

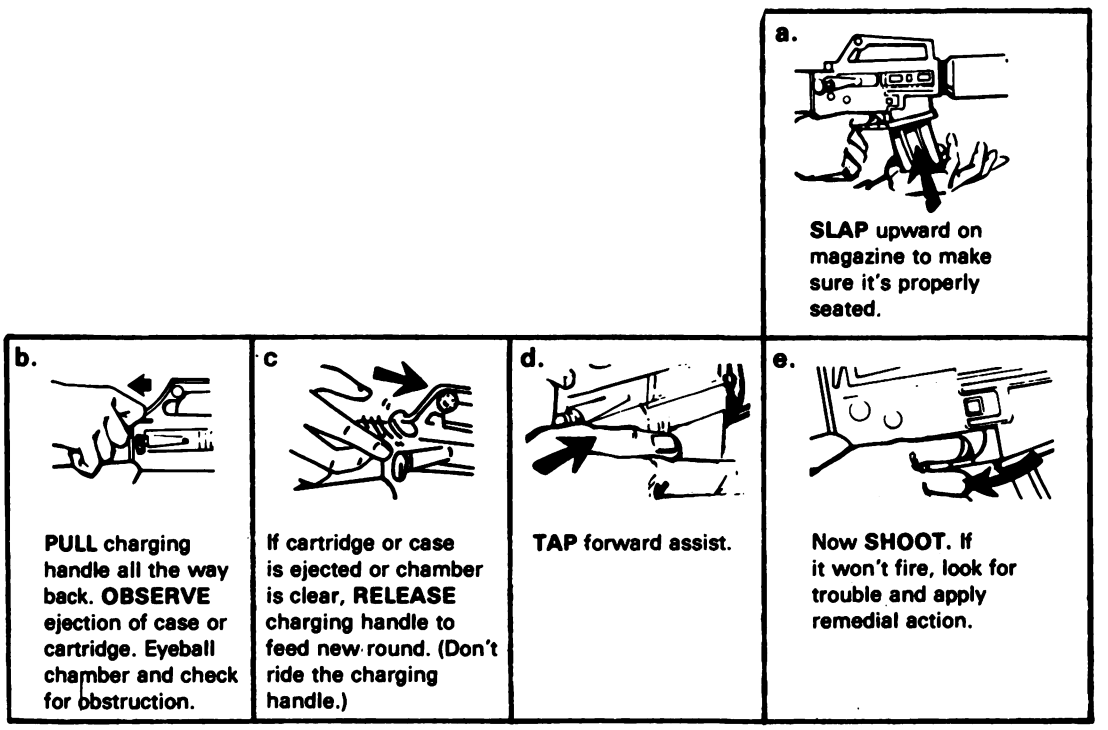
a.
SLAP upward on magazine to make sure it's properly seated.
b.
PULL charging handle all the way back. OBSERVE ejection of case or cartridge. Eyeball chamber and check for obstruction.
c
If cartridge or case is ejected or chamber is clear, RELEASE charging handle to feed new round. (Don't ride the charging handle.)
d.
TAP forward assist.
e.
Now SHOOT. If it won't fire, look for trouble and apply remedial action.

Figure 3.

4. Remedial action.

WARNING: If your rifle stops firing with a live round in the chamber of a hot barrel, remove the round fast. However, during training, if you cannot remove it within 10 seconds, wait 15 minutes with the rifle pointing in a safe direction. This way you won't get hurt by a possible ammo cook-off, which could happen 10 seconds after contact with a hot chamber (fig 4).

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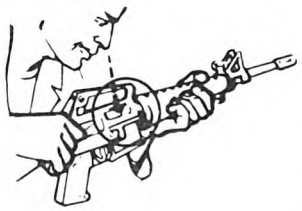
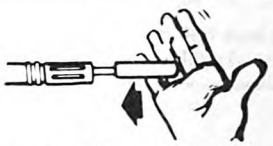
PERFORMANCE MEASURES (cont)

a.
If your rifle fails to fire after performing steps a thru e for immediate action, check again for jammed cartridge case.



b.



If a cartridge case is in the chamber, tap it out with a cleaning rod.

Figure 4.

WARNING: If you hear a "POP" or feel less RECOIL during firing, immediately CEASE FIRE, remove the magazine (fig 5, item 1), lock the bolt to the rear (fig 5, item 2), and place the selector lever on the "SAFE" position (fig 5, item 3). Inspect the bore, or insert a cleaning rod into the bore to insure there is not a round lodged in it (fig 5, item 4). If a projectile is lodged in the barrel of the weapon, DO NOT attempt to remove it. Turn the weapon in to the armorer.

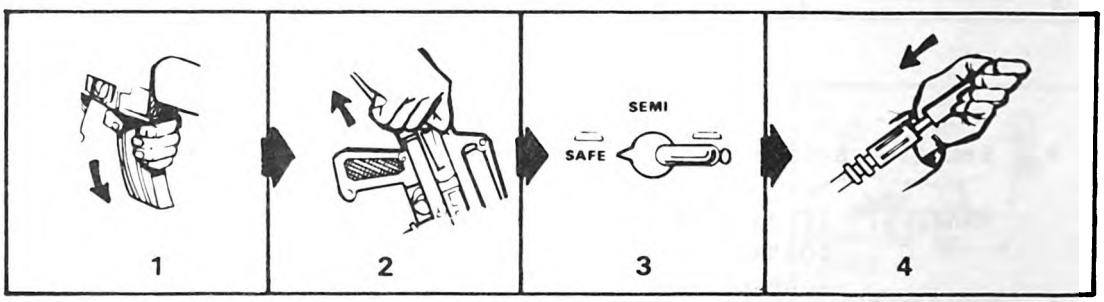


Figure 5.

5. Clearing the rifle (fig 6).

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PERFORMANCE MEASURES (cont)

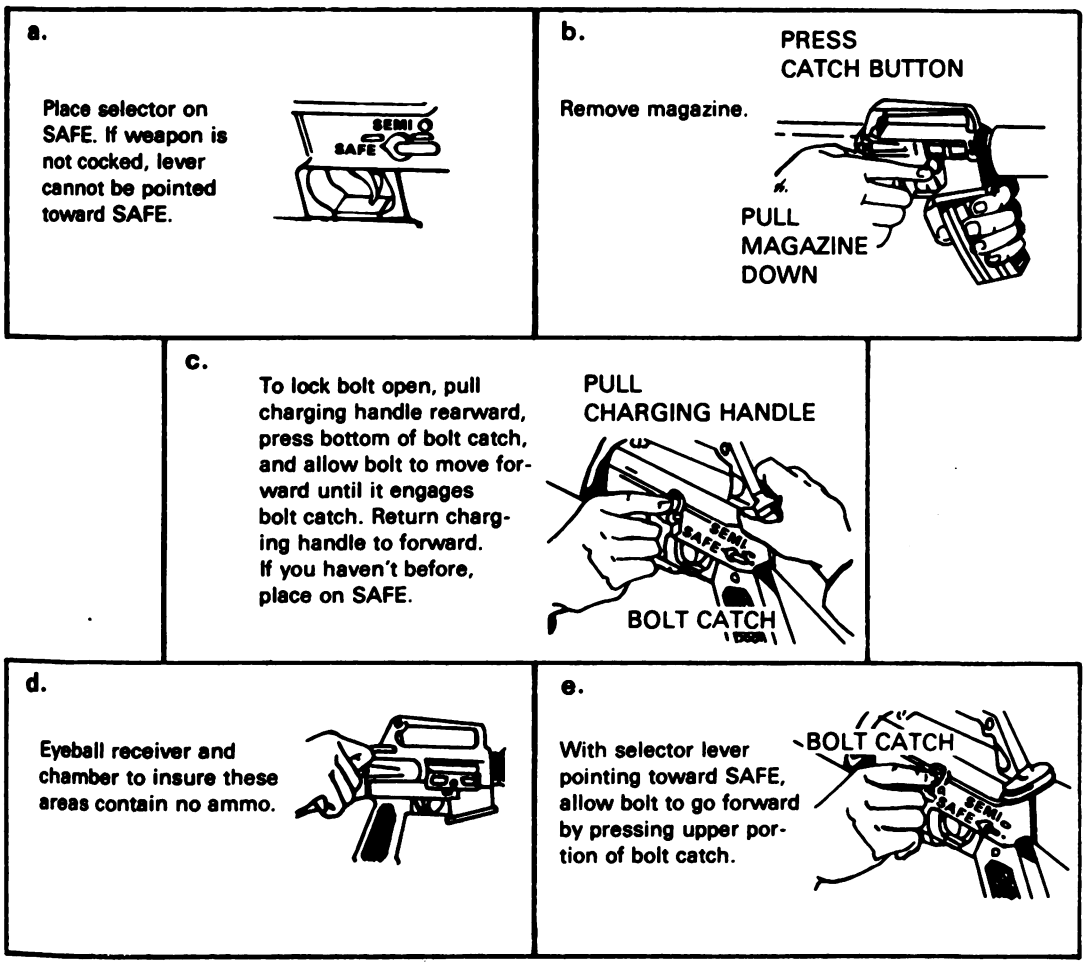
a.
Place selector on SAFE. If weapon is not cocked, lever cannot be pointed toward SAFE.
SEMI
SAFE
b.
Remove magazine.
PRESS CATCH BUTTON
PULL MAGAZINE DOWN
c.
To lock bolt open, pull charging handle rearward, press bottom of bolt catch, and allow bolt to move forward until it engages bolt catch. Return charging handle to forward. If you haven't before, place on SAFE.
PULL CHARGING HANDLE
BOLT CATCH
d.
Eyeball receiver and chamber to insure these areas contain no ammo.
e.
With selector lever pointing toward SAFE, allow bolt to go forward by pressing upper portion of bolt catch.
BOLT CATCH

Figure 6.

REFERENCES

TM 9-1005-249-10, Operator's Manual, M16A1 Rifle, pp 11, 36 thru 37, 42 thru 45.
TEC 939-071-0009-F, Loading and Unloading the M16A1 Rifle.
TEC 939-071-0012-F, Preventing and Correcting Common Malfunctions.

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BATTLESIGHT ZERO AN M16A1 RIFLE

CONDITIONS

On a 25-meter firing range, given an M16A1 rifle equipped with either the standard M16A1 sights or the low light level sight system (LLLSS), 18 rounds of 5.56-mm ammunition, battlesight zero target, sandbag for support, and a rifle shot group analysis card: semi-automatic fire with M16A1 and M14 rifles (GTA 21-1-4, Mar 74).

STANDARDS

Place the center of a three-round shot group at the X which is 2.4 centimeters below the Canadian bull's-eye, and have the shot group touch or fall within a 5.2-centimeter-diameter circle centered on the X.

PERFORMANCE MEASURES

1. Sights. The M16A1 rifle has two adjustable sights. Elevation adjustments are made on the front sight, and windage adjustments are made on the rear sight. The rifle comes equipped with either the standard sight system or LLLSS.

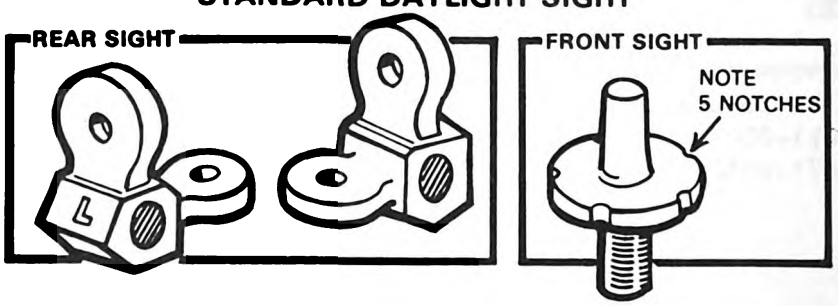
   a. The standard sight system.

      (1) The rear sight has two parts:

         (a) An aperture marked "L" for ranges beyond 300 meters and an unmarked aperture for ranges from 0 to 300 meters.

         (b) A windage drum for windage adjustments.

STANDARD DAYLIGHT SIGHT



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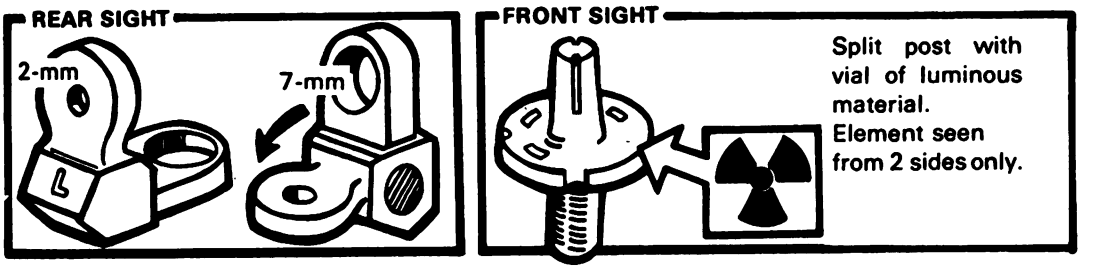
PERFORMANCE MEASURES (cont)

(2) The front sight consists of a rotating sight post with a spring-loaded detent.

b. The low light level sight system.

Note. Not every rifle will have this sight.



(1) The rear sight in this system also has two parts:

(a) A 2-mm aperture marked L which is used for zero and ranges to 460 meters under normal conditions. The other (7-mm) aperture is larger than the standard sight and is used for night and limited visibility firing.

(b) A windage drum for windage adjustments (same as the standard system).

(2) The front sight has only four notches (clicks) of elevation (the standard system has five). This permits the firer to adjust the sight so he can see the luminous part through the rear sight.

CAUTION: The front sight post contains a small glass vial of radioactive promethium 147. Take care not to bump, abuse, tamper with, or alter the post in any manner. Do not blacken or soot up the front sight.

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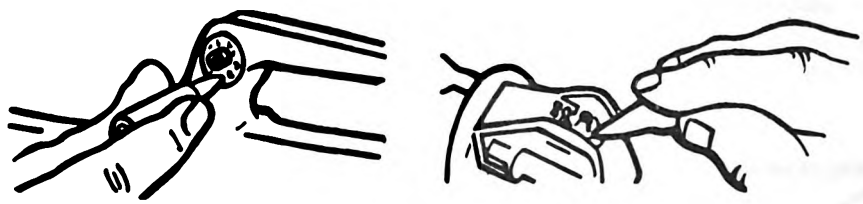
PERFORMANCE MEASURES (cont)

2. Sight adjustment (low light and standard).



a. Rear sight. To adjust windage, depress detent and rotate the drum to desired direction. To move the point of impact to the right, turn the drum clockwise in the direction of the arrow and letter R. To move to the left, move the drum counterclockwise. Each graduation (notch) moves the point of impact of bullet as indicated in chart.

b. Front sight. To adjust elevation, depress the detent, rotate the post. To raise the strike of bullet, rotate the post in the direction of the arrow marked UP. Reverse the direction of rotation to lower the strike of bullet. Each graduation (notch) moves the point of impact of the bullet as indicated in the chart.

IMPACT		DISTANCE
STANDARD	LOW LIGHT LEVEL	
0.7cm (17/62in)	0.9cm (23/64in)	25 meters
2.8cm (1-3/32in)	3.5cm (1-3/4in)	100 meters
5.6cm (2-13/64in)	7.0cm (2-3/4in)	200 meters

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PERFORMANCE MEASURES (cont)

3. Battlesight zeroing.

a. Sight picture. In aiming, the firer is concerned with correctly pointing his rifle so the bullet will hit the target when he fires. To do this, he must have the rear sight, the front sight post, and the target or aiming point in their proper relationship--known as sight picture. A correct sight picture is obtained when the sights are perfectly aligned and the aiming point (target) is in the correct relationship to the front sight post (fig 2B). Sight picture includes two basic elements: sight alignment and placement of the aiming point.

b. Sight alignment. To obtain the correct sight alignment, the sights are aligned as shown in figure 2A. Notice that the top center of the front sight post is exactly in the center of the rear sight aperture. If an imaginary horizontal line were drawn through the center of the rear sight aperture, the top of the front sight post would touch this line. If an imaginary vertical line were drawn through the center of the rear sight aperture, the line would bisect the front sight post. The firer makes sure he has perfect sight alignment by concentrating his attention and focusing his eye on the front sight post through the indistinct or fuzzy appearing rear sight aperture. By doing this, any errors in sight alignment can be easily detected and corrected.

c. Placement of the aiming point. The aiming point (target on which the firer has aligned his rifle sights) is correctly placed when it is centered on and appears to touch the top of the front sight post (fig 2C). If the aiming point is correctly positioned, an imaginary vertical line drawn through the center of the front sight post will appear to split the front sight post in half.

d. Battlesight zero target. The standard 25-meter target (fig 1) is used when determining the battlesight zero for the M16A1 rifle. Vertical and horizontal lines are printed on the target, forming 1.4-centimeter squares. One click of elevation or windage will move the strike of the bullet 0.7 centimeters at a range of 25 meters. Thus, on the 25-meter target, two clicks of elevation or windage will move the strike of the bullet one square.

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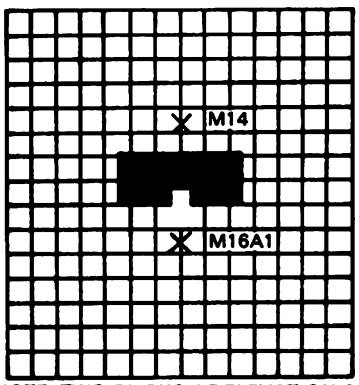
PERFORMANCE MEASURES (cont)

Note. The LLLSS has only four clicks of elevation, but it is adjusted the same as the standard sight. The difference in sight movement per click is not critical during firing.



NOTE: TWO CLICKS OF ELEVATION OR WINDAGE WILL MOVE THE STRIKE OF THE BULLET ONE SQUARE ON THIS TARGET.

Figure 1.

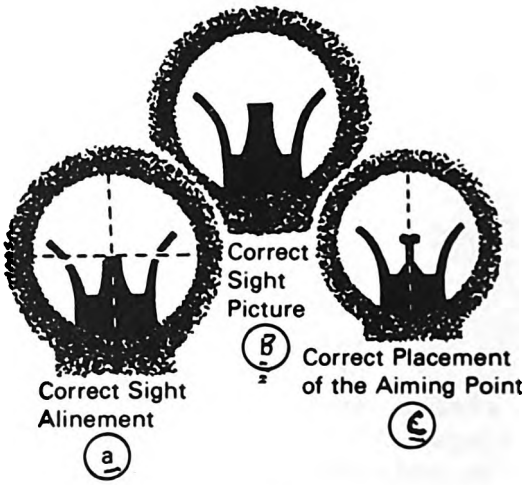


Figure 2.

e. Determining the battlesight zero. The 250-meter battlesight zero is determined by firing a series of three-round shot groups at the 25-meter target. The firer aims at the distinctive aiming point at the bottom center of the black rectangle (base of the white cutaway portion) and adjusts his sights until the center of this acceptable shot group is located 5.2 centimeters directly below the aiming point (fig 3) on or around the X.

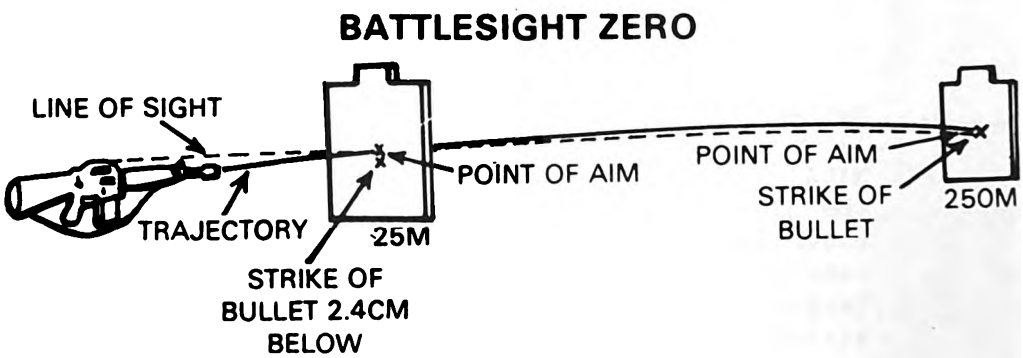


Figure 3.

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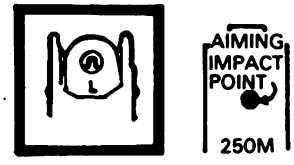
PERFORMANCE MEASURES (cont)

Note. To battlesight zero, adjust your sights so you can hit an aiming point at 250 meters. Zeroing can also be done on a 25-meter range by adjusting the sights so that the bullet will strike 2.4 centimeters below the point of aim. If your M16A1 has an LLLSS and you cannot see the vial after zeroing, turn front sight post one click down for use during periods of limited visibility.

4. Using low light level (promethium) sight system.

a. During daylight firing, use aperture marked L. Effective range is 250 meters (original battlesight zero).



b. At night and in limited visibility, use unmarked (7-mm) aperture. Obtain good sight picture using daylight procedure. After target detection, obtain good sight alignment by centering top of luminous portion of front sight post within the 7-mm aperture on target and fire. Under certain light conditions, the front sight post can be seen, but you can't determine whether you are looking through, above, or to the side of rear sight aperture. Practice positioning the stock against your shoulder and looking through rear aperture.

REFERENCES

FM 23-9, M16A1 Rifle and Rifle Marksmanship, chap 4, pp 83 thru 86.
TM 9-1005-249-10, Operator's Manual, M16A1 Rifle, pp 34 and 35; 38 thru 41.
M16A1 Rifle Marksmanship Training Program of Instruction.

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QUALIFY WITH THE M16A1 RIFLE

CONDITIONS

Situation 1: Daylight Firing. On a standard record firing range, given a zeroed M16A1 rifle equipped with either the standard M16A1 rifle sights or the promethium sights, 4 magazines of 10 rounds each, a record fire scorecard, and the requirement to fire record fire for qualification.

Situation 2: Night Firing. On a standard night fire record range, given a zeroed M16A1 rifle equipped with either the standard M16A1 rifle sights or the LLLSS sights, 3 magazines of 3 rounds each for practice firing and 80 rounds for record fire, and the requirement to fire night record fire for qualification.

STANDARDS

Situation 1: Attain a MINIMUM SCORE of 17 hits out of a possible 40 exposures.

Situation 2: Attain a MINIMUM SCORE of 20 hits out of a possible 40 exposures.

QUALIFICATION SCORES AND RATINGS:

	STANDARD RECORD	KNOWN DISTANCE	COURSE "C"
Possible	40	500	42
Expert	28-40	420-500	31 and above
Sharpshooter	24-27	360-419	24-30 inclusive
Marksman	17-23	300-359	11-23 inclusive
Unqualified	16 and below	299 and below	10 and below

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CONDITIONS (cont)

Note. FM 23-9 supersedes FM 23-71; however, premobilization readiness proficiency "C" courses prescribed for use by reserve components were inadvertently omitted from 23-9 as was change 1 to FM 23-71 which added appendix I for those units which have only known-distance facilities. These courses of fire may be used unless superseded by subsequent instructions. The following conditions and standards are to be used by units that do not have a standard record fire range.

CONDITIONS

Situation 3: During daylight on a known-distance range (as described in para 5 of app I, FM 23-71, C1), given a zeroed M16A1 rifle, 50 rounds of caliber 5.56-mm ammunition (5 magazines of 10 rounds each to engage each target with 10 rounds), a requirement to fire, Record Firing, Known Distance (total rounds 100) as outlined in para 16d, appendix I of FM 23-71.

Situation 4: During daylight on a 1,000-inch range, given a zeroed M16A1 rifle, 42 rounds of caliber 5.56-mm ammunition, a requirement to fire standard course "C" for record fire as outlined in appendix D of FM 23-71.

STANDARDS

Situation 3: Fire Known-Distance Record Firing Table as outlined in para 16, appendix I of FM 23-71 (c1) and achieve a minimum score of 300.

Situation 4: Fire Record Fire Course "C" as outlined in appendix D of FM 23-71 and achieve a minimum score of 11.

WARNING: Dangerous procedures.

1. Be sure the cam pin is installed in the bolt group. If it isn't, your rifle can still fire, but it could possibly explode, causing you harm.

2. Do not exchange or switch bolt assemblies from one M16A1 to another. This could cause damage to both you and the rifle.

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STANDARDS (cont)

3. If your rifle stops firing with a live round in the chamber of a hot barrel, remove the round fast. However, during training, if you cannot remove it within 10 seconds, wait 15 minutes with the rifle pointing in a safe direction. This way you won't get hurt by a possible ammo cook-off, which could happen 10 seconds after contact with a hot chamber.

4. Use only authorized ammo that is manufactured to US specifications.

5. If your bolt fails to unlock and you try to free it by banging the butt stock on the ground, keep yourself clear of the muzzle.

6. If there's water in the barrel, don't fire the rifle. It could explode.

7. If a noticeable difference in sound or recoil is experienced, STOP FIRING. Either condition could indicate an incomplete propellant burn and a bullet still in the bore. Retract bolt slowly and remove fired cartridge case. Clear weapon and check for unburned powder grains in the receiver or bore and for a bullet in the bore. Remove unburned propellant or bullet from bore before resuming firing, or barrel could explode. If bullet is lodged in bore, turn in rifle to direct support maintenance.

REFERENCES

FM 23-9, M16A1 Rifle and Rifle Marksmanship, chap 9, sec II, p 125, C1 (to be published.)
FM 23-71, C1, Rifle Marksmanship, app D, p 171.
TM 9-1005-249-10, Operator's Manual, M16A1 Rifle, M16A1 Rifle Marksmanship Training Program of Instruction.

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SQT ADMINISTRATION REQUIREMENTS:

SQT credit will be awarded as follows:

Arms Qualification/Evaluation	SQT Units
Unqualified (NO GO)	0
Marksman (GO)	1
Sharpshooter (GO)	1
Expert (GO)	1
Nonobserved	Neither counts for nor against total SQT score.

The night-firing portion of arms qualification will not be included in the performance certification component (PCC) of the SQT.

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MOUNT/DISMOUNT AN AN/PVS-2 ON AN M16A1 RIFLE

CONDITIONS

Given an AN/PVS-2 sight in shipping container, weapon adapter bracket, and an M16A1 rifle; daylight or with artificial light source.

STANDARDS

1. Mounting: Within 5 minutes, the adapter assembly must be secured to the upper receiver, and the sight must be mounted on the adapter with the two locking knobs of the boresight mount assembly locked in place.

2. Dismounting: Remove the sight and mounting bracket and return them to the carrying case.

PERFORMANCE MEASURES

1. To mount the M16A1 adapter bracket to the M16A1 rifle (see figs 1 and 2), unthread the wingnut (1) to the thread stop on the screw. Pull the tab (2) away from the weapon adapter assembly (3). Slide the mounting ear (4) under the handle and position the weapon adapter assembly flat against the top of the receiver and all the way forward. Firmly tighten the wingnut (1) until the tab (2) is pulled tightly against the handle and weapon adapter assembly.

2. To mount the AN/PVS-2 sight to the weapon adapter bracket, remove the sight from its shipping container. Rotate the lock knobs of the boresight mount assembly rearward (toward the rubber eyeshield) until they come to stop on the pins located on the assembly. Slide the boresight mount assembly into the guide rail of the adapter bracket from the rear until positioned against the pin stop of the guide rail. The scope is locked to the adapter bracket by rotating the two locking knobs of the boresight mount assembly in a forward direction.

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PERFORMANCE MEASURES (cont)

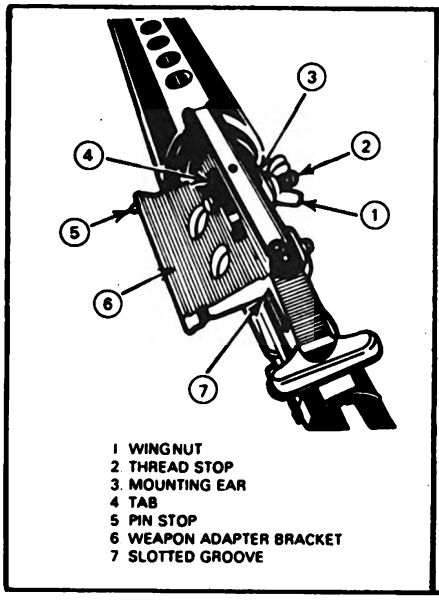

Figure 1.

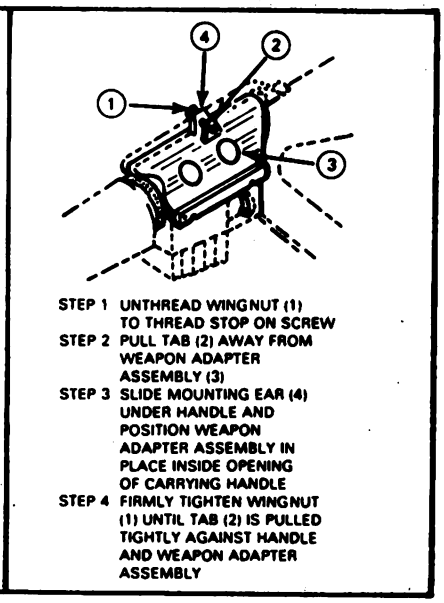
STEP 1 UNTHREAD WINGNUT (1) TO THREAD STOP ON SCREW
STEP 2 PULL TAB (2) AWAY FROM WEAPON ADAPTER ASSEMBLY (3)
STEP 3 SLIDE MOUNTING EAR (4) UNDER HANDLE AND POSITION WEAPON ADAPTER ASSEMBLY IN PLACE INSIDE OPENING OF CARRYING HANDLE
STEP 4 FIRMLY TIGHTEN WINGNUT (1) UNTIL TAB (2) IS PULLED TIGHTLY AGAINST HANDLE AND WEAPON ADAPTER ASSEMBLY

Figure 2.

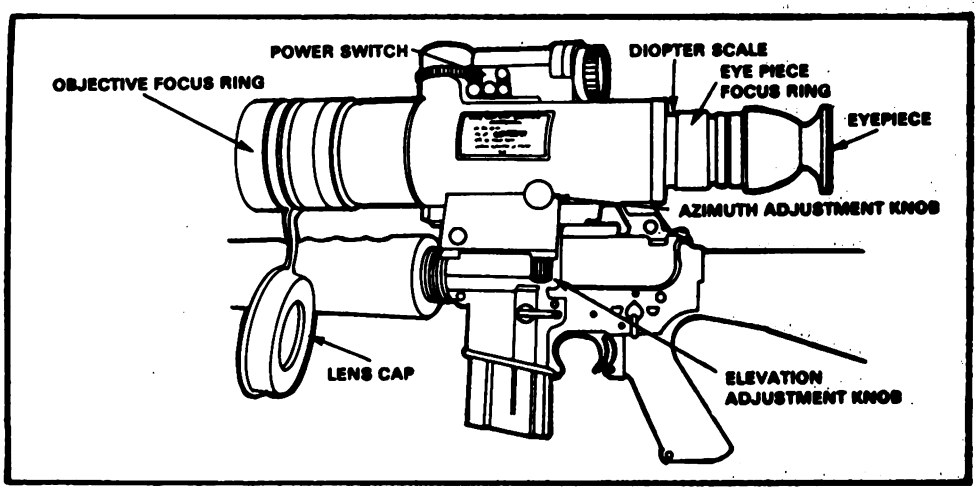

Figure 3.

REFERENCES

FM 23-9, M16A1 Rifle and Rifle Marksmanship, app B, p 147.

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ZERO AN AN/PVS-2 WHEN MOUNTED ON AN M16A1 RIFLE

CONDITIONS

During daylight or darkness, on a zero firing range, given an AN/PVS-2 mounted on a zeroed M16A1 rifle, magazine, 18 rounds of ammunition, a silhouette target 25 meters from the firing point, an M3 bipod, and sandbags.

STANDARDS

Obtain the correct relationship between the point of aim and the center of the shot group.

PERFORMANCE MEASURES

To zero the AN/PVS-2 at 25 meters:

1. Take a prone, bipod-supported position 25 meters from the target.
2. Fit the rubber eyeshield around the eye.
3. Move the power switch to ON.
4. Set the diopter to zero and then adjust the focusing ring for a sharp sight reticle.
5. Adjust the range focus ring for a sharp image.
6. Sight through the scope and move the aiming dash to the center of the mass of the target.
7. Fire three rounds, keeping the aiming dash on the same point on the target each time a round is fired.
8. Check the target and find the center of the shot group in relation to the point of aim.

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PERFORMANCE MEASURES (cont)

9. Adjust the sight reticle by turning the elevation and azimuth adjustment knobs until the aiming dash is on the center of the shot group. One click of the azimuth or elevation adjustment knob will move the strike of the bullet 1.2 centimeters (approximately 1/2 inch). Make adjustments in the direction of the error from where the center of the shot group must be.

10. Repeat performance measures 5 thru 9, until you get the proper relationship between the point of aim and the center of the shot group.

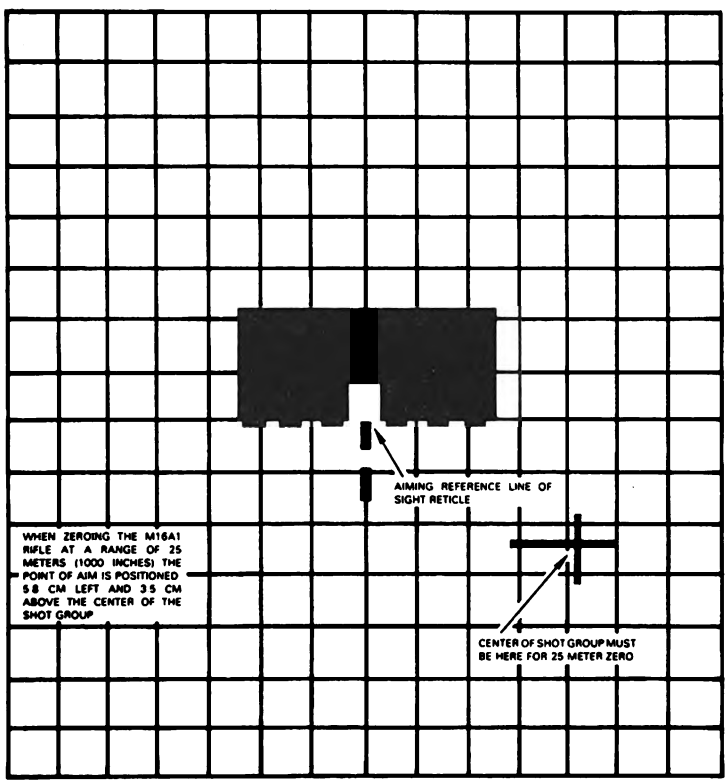
AIMING REFERENCE LINE OF SIGHT RETICLE
WHEN ZEROING THE M16A1 RIFLE AT A RANGE OF 25 METERS (1000 INCHES) THE POINT OF AIM IS POSITIONED 5.8 CM LEFT AND 3.5 CM ABOVE THE CENTER OF THE SHOT GROUP
CENTER OF SHOT GROUP MUST BE HERE FOR 25 METER ZERO

Figure 1.

REFERENCES

FM 23-9, M16A1 Rifle and Rifle Marksmanship, p 149.
TC 23-11, Starlight Scope Small Hand-held or Individual Weapons Mounted Model No. 6060, pp 43 thru 46.
TEC 953-071-0061-F, AN/PVS-2 Starlight Scope.

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ENGAGE A TARGET WITH A RIFLE USING AN AN/PVS-2

CONDITIONS

Given an M16A1 rifle with a mounted and zeroed AN/PVS-2, one magazine with 18 rounds of 5.56-mm ammunition, during the hours of darkness on an M16 rifle range with three E-type silhouettes, one each at ranges of 50-100, 150, and 200-250 meters.

STANDARDS

Fire all 18 rounds within 2 minutes and hit the targets a minimum of 9 times (two hits must be on each of the targets at ranges other than 150 meters.

PERFORMANCE MEASURES

1. Turn the AN/PVS-2 on, and position the rubber eyeshield around the eye. Sight through the scope, and position the aiming reference line of the sight reticle on the target (see Task Summary 071-311-2304, Zero AN/PVS-2 when Mounted on M16A1 Rifle).

2. Fire the weapon utilizing correct marksmanship procedure (see Task Summary 071-311-2004, Battlesight Zero an M16A1 Rifle).

REFERENCES

None.

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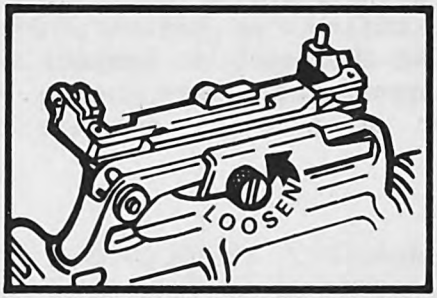
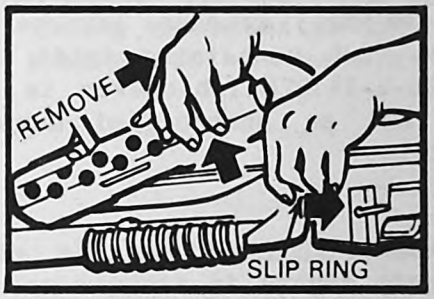
PERFORMANCE MEASURES (cont)

WARNING. Be sure weapon is NOT loaded.

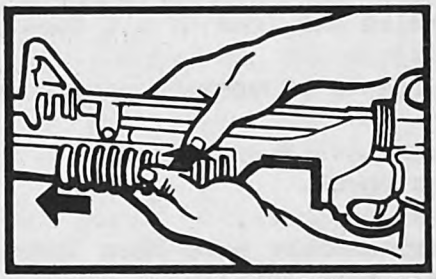
1. Field strip. To pass inspection, your grenade launcher must be spotless.



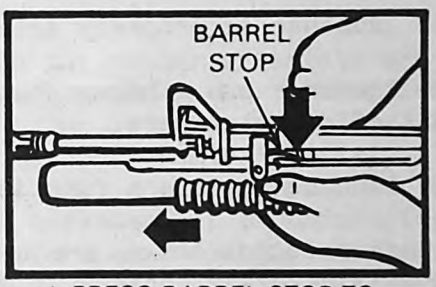
a. THE QUADRANT SIGHT (IF USED) IS REMOVED BY LOOSENING THE KNURLED SCREW ON THE RIGHT SIDE.



PULL BACK SLIP RING. LIFT UP ON HANDGUARD AND PULL TO REAR TO REMOVE.



c. PRESS BARREL LATCH AND MOVE BARREL FORWARD TO STOP.



d. PRESS BARREL STOP TO RELEASE BARREL FROM RECEIVER AND REMOVE.

Figure 2.

WARNING: No unauthorized disassembly is allowed. Your armorer is the man to see for further disassembly.

2. Cleaning materials, lubricants, and care of the launcher.

   a. Cleaning materials.

      (1) Rifle bore cleaner (RBC) is used to clean the bore of the launcher and provides temporary protection from corrosion.

      (2) Any dry cleaning solvent that does not contain acid can be used for cleaning the launcher of dirt, grease, oil, and corrosion preventives.

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PERFORMANCE MEASURES (cont)

b. Lubricants.

(1) Military lubricant MIL-L-46000A Lubricating Oil, semi-fluid automatic weapon (LSA) is used for lubricating the launcher at temperatures of above -35° Fahrenheit.

(2) Lubricating oil, arctic weather MIL-L-141708 (LAW) is used at temperatures below 0° F.

c. Cleaning the launcher and ammunition.

(1) Bore. Attach a clean, dry rag to the thong and thoroughly moisten the rag with bore cleaner. After pulling the rag through several times, attach the bore brush to the thong and pull it through the bore several times. Repeat, using dry rags, inspecting the rag each time. Finally, pull a lightly oiled (LSA) rag through the bore to leave a light coat of oil inside the barrel. When cleaning the bore, the bore brush and rags should be pulled from the breech end to the muzzle end.

(2) Breech insert. Clean the face of the breech insert retainer with a patch and bore cleaner. Remove the bore cleaner with dry rags, and then oil the face of the breech lightly.

(3) All other parts. Use a brush and dry rag to clean all other parts and surfaces. Apply a light coat of LSA to the exterior of the launcher after cleaning. For cleaning the rifle portion of the launcher, see Task Summary 071-311-2001, Perform Operator Maintenance on an M16A1 Rifle, Magazines, and Ammunition.

(4) Ammunition. Wipe any dirt or grime from ammunition with a dry cloth. If ammunition is corroded, turn it in to the ammunition point. Do not oil ammunition.

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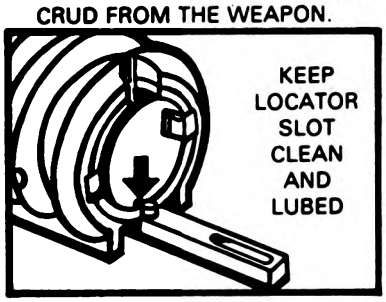
PERFORMANCE MEASURES (cont)

Note. Caring for your launcher is simply good insurance. A little preventive maintenace on your part will prevent malfunction.

a. CLEAN ALL THE DUST AND CRUD FROM THE WEAPON.



b. LUBE BARREL TRACKS AND ALL METAL SURFACES WITH A LIGHT COAT OF OIL.

c. WITH BARREL ON, APPLY A FEW DROPS OF OIL THRU FIRING PIN HOLE. KEEP WEAPON POINTED UP 10-15 SECONDS. CYCLE WEAPON AND PULL TRIGGER TO SPREAD THE OIL.

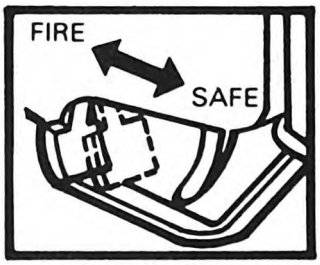
d. TURN LAUNCHER UPSIDE DOWN AND LUBE THE SAFETY DETENT. IT'S IN THE RECEIVER IN FRONT OF THE SAFETY.

CAUTION; KEEP THE WEAPON CLEAN AND LUBED, EVEN WHEN IT WILL BE UNUSED FOR A PERIOD OF TIME.

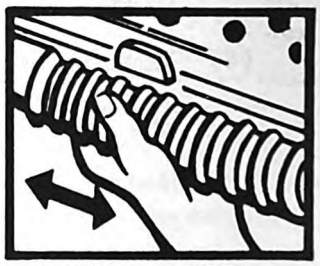
Figure 3.

d. Inspect bore for dirt, water, oil, and foreign matter (fig 4).

CHECK FOR LOOSE BREECH INSERT



CHECK "SAFE" AND "FIRE" POSITIONS.



CHECK BARREL STOP AND LATCH.

Figure 4.

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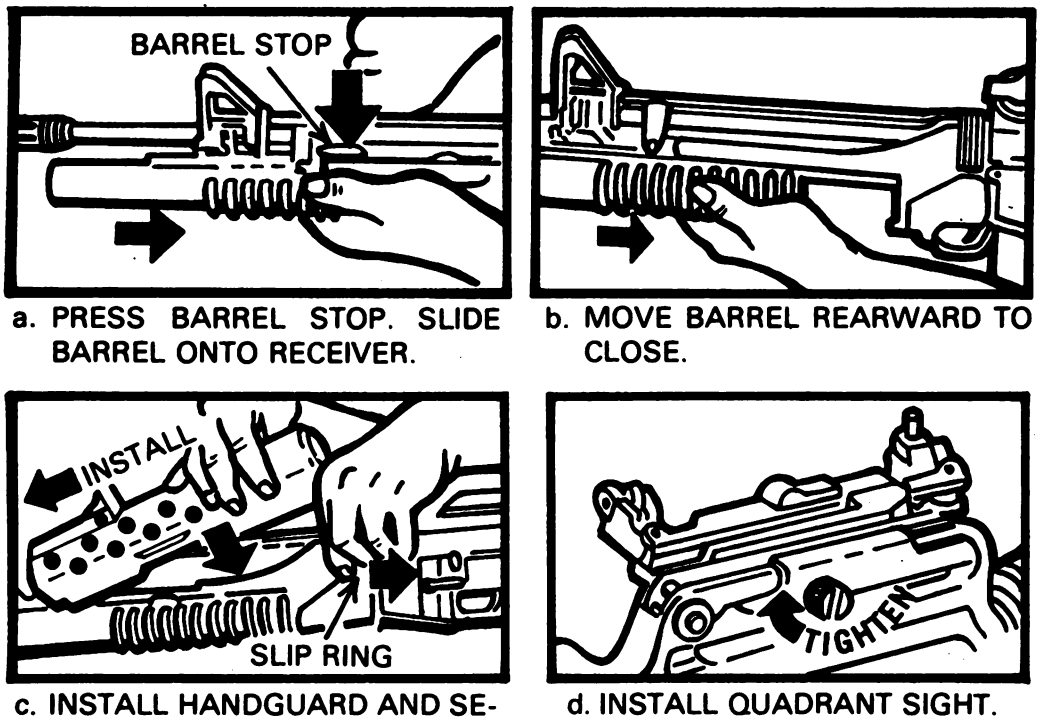
PERFORMANCE MEASURES (cont)

3. Inspection. While cleaning your M203, you should also inspect for serviceability of parts. If you find a part which you think is unserviceable, take it to your armorer; he will make the final determination on serviceability and replace parts where necessary. If you do not know what to look for insofar as serviceability is concerned, see the TEC lessons listed at the end of this task.

4. Assembly procedure for the grenade launcher merely reverses disassembly steps (fig 5). For disassembly and assembly of the M16A1 rifle portion of the weapon, refer to Task Summary 071-311-2001, Perform Operator Maintenance on an M16A1 Rifle, Magazines, and Ammunition.



a. PRESS BARREL STOP. SLIDE BARREL ONTO RECEIVER.

b. MOVE BARREL REARWARD TO CLOSE.

c. INSTALL HANDGUARD AND SECURE WITH SLIP RING.

d. INSTALL QUADRANT SIGHT.

Figure 5.

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PERFORMANCE MEASURES (cont)

5. Perform a functional check.

a. Check proper operation of sears. Cock launcher and pull the trigger. Firing pin should release. Hold trigger to rear. Cock launcher. Release trigger, then pull. Firing pin should release.

WARNING: The launcher could fire without pulling the trigger if the sears do not function properly.

b. Check safety in both "safe" and "fire" positions with trigger. Launcher must be cocked before safety can be placed in "safe" position.

c. Check leaf sight windage adjustment screw for proper operation. Do not move elevation adjustment screw, if the weapon has been zeroed.

d. Move barrel forward and back to be sure stop and barrel latch function.

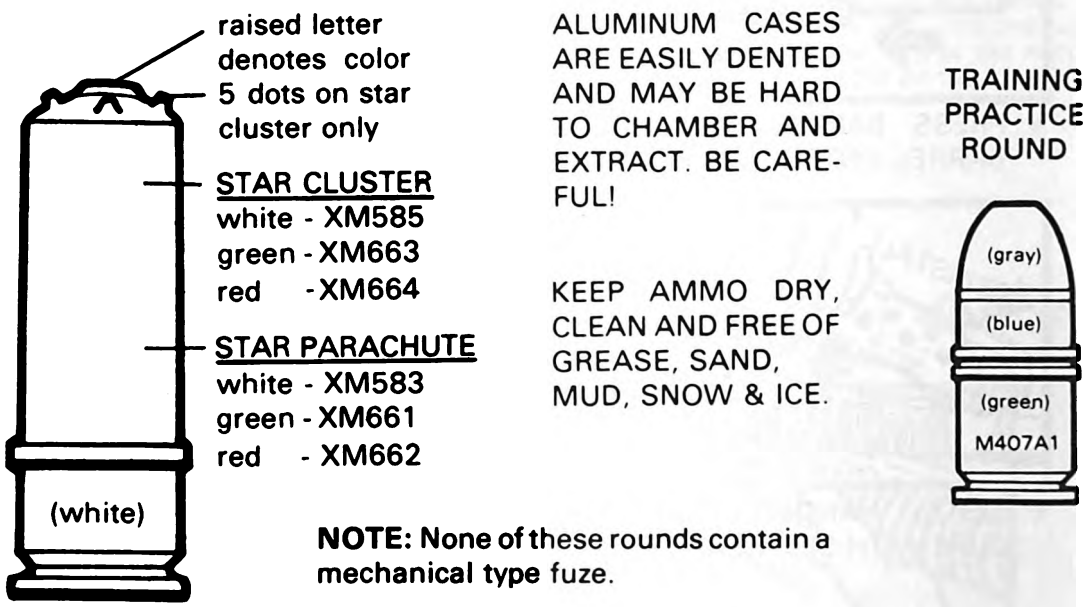
raised letter denotes color
5 dots on star cluster only
STAR CLUSTER
white - XM585
green - XM663
red - XM664
STAR PARACHUTE
white - XM583
green - XM661
red - XM662
(white)
ALUMINUM CASES ARE EASILY DENTED AND MAY BE HARD TO CHAMBER AND EXTRACT. BE CAREFUL!
KEEP AMMO DRY, CLEAN AND FREE OF GREASE, SAND, MUD, SNOW & ICE.
TRAINING PRACTICE ROUND
(gray)
(blue)
(green)
M407A1
NOTE: None of these rounds contain a mechanical type fuze.

Figure 6. 40-mm ammo pyrotechnic signal and spotting round.

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PERFORMANCE MEASURES (cont)

WARNING: The danger radius of practice grenades is 20 meters. Do not destroy ammo by mechanical means. The practice round M407A1 Fuze arms between 14 to 28 meters (45 to 93 ft).

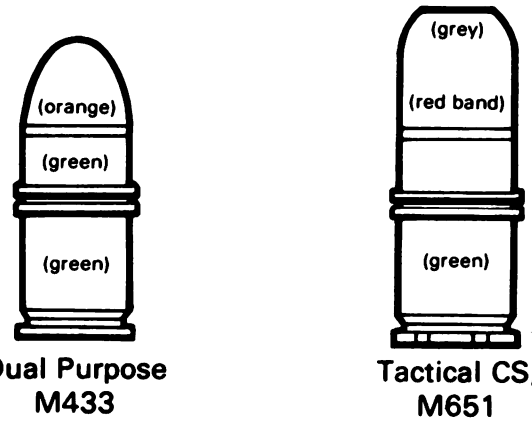

Figure 7. 40-mm ammo high explosive (HE) service.

WARNING: The danger radius of the HE grenades is 130 meters. The M433 round arms within 14 to 28 meters. The M651 arms within 10 to 30 meters and has a burn time of 32 seconds.

REFERENCES

FM 23-31, 40-mm Grenade Launcher, M203 and M79, cnap 3, sec I, p 3-1.
TM 9-1010-221-10, Operator's Manual 40-mm Grenade Launcher, M203, pp 4-8, 15, and 16.
TM 9-1310-202-12, Operator and Organizational Maintenance Manual: Cartridges 40-mm, M386, M441, and M397, chap 2, p 2-1, para 1b(4)).
TEC 940-071-0086-F, M203 Grenade Launcher: Disassembly, Assembly, and Maintenance.
TEC 940-071-0088-F, M203 Grenade Launcher: Zeroing and Target Engagement.

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LOAD, UNLOAD, AND CLEAR THE M203 GRENADE LAUNCHER

CONDITIONS

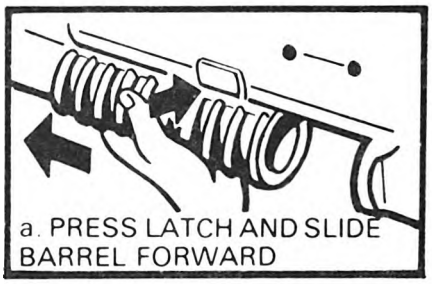
Given an M203 grenade launcher and one round of 40-mm ammunition (live or practice).

STANDARDS

Load, unload, and clear the M203 in accordance with the performance measures below:

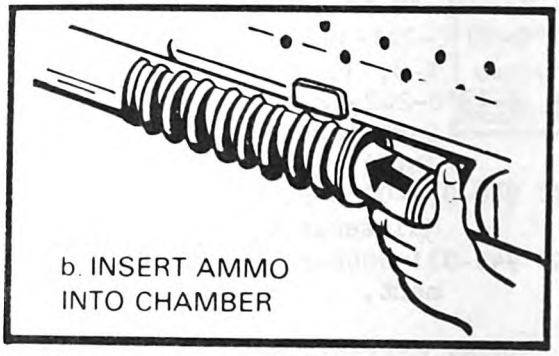
PERFORMANCE MEASURES

1. Load the weapon.



WARNING: Keep the muzzle down range and clear of all troops.

CAUTION: Prior to loading, wipe bore and chamber clean and dry with a clean cloth.



WARNING: Make sure you have the right ammunition. Never load aircraft ammunition M384 (HE) or M385 (practice).

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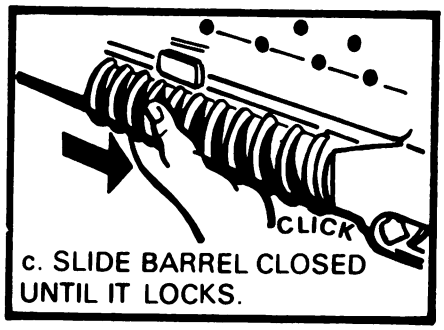
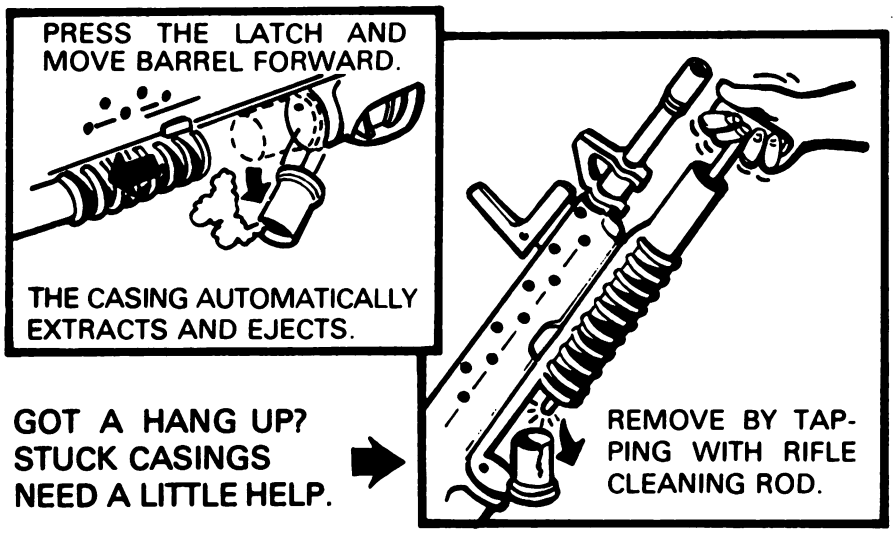
PERFORMANCE MEASURES (cont)

CAUTION: Make sure the ammunition is dry, clean, and undented.



2. Unload the weapon.


PRESS THE LATCH AND MOVE BARREL FORWARD.
THE CASING AUTOMATICALLY EXTRACTS AND EJECTS.
GOT A HANG UP? STUCK CASINGS NEED A LITTLE HELP.
REMOVE BY TAPPING WITH RIFLE CLEANING ROD.

3. Clear the weapon.

a. Depress the barrel latch and slide barrel forward.

b. Keeping the weapon pointed down range, look into the barrel to be sure there is no round or cartridge case in the barrel.

c. Slide the barrel rearward, locking it to the breech.

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REFERENCES

FM 23-31, 40-mm Grenade Launchers, M203 and M79, chap 3, sec II, p 3-2.
TM 9-1010-221-10, Operator's Manual 40-mm Grenade Launcher M203, pp 20, 21, and 26.
TEC 940-071-0086-F, M203 Grenade Launcher: Disassembly, Assembly and Maintenance.

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ZERO AN M203 GRENADE LAUNCHER

CONDITIONS

Given an unzeroed M203 grenade launcher, five rounds of HE or TP ammunition (for each type sight), and a firing range.

STANDARDS

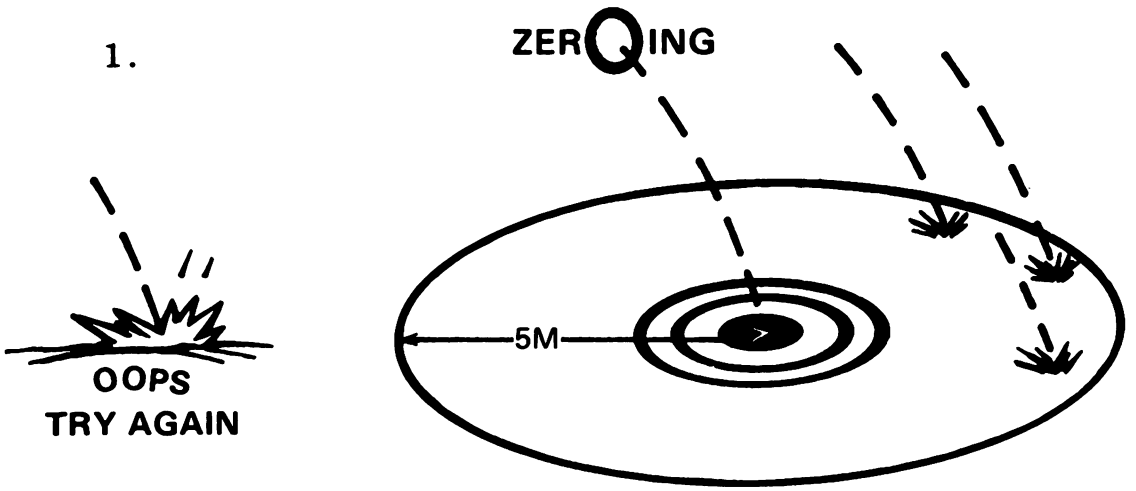
Gunner will obtain an elevation and windage sight setting (on both leaf and quadrant sights) which will enable him to hit within 5 meters of his point of aim at a distance of 200 meters with two consecutive rounds.

PERFORMANCE MEASURES

1. Zeroing.

   WARNING: Do not zero in under 100 meters.

1.



Select a target at 200 meters and fire a round. If the round does not fall within 5 meters of target, zeroing procedures are called for and sight adjustments must be made for more or less elevation. Windage adjustments must be made for each firing. After each round fired, make necessary adjustments until 2 consecutive rounds land within 5 meters of the aiming point.

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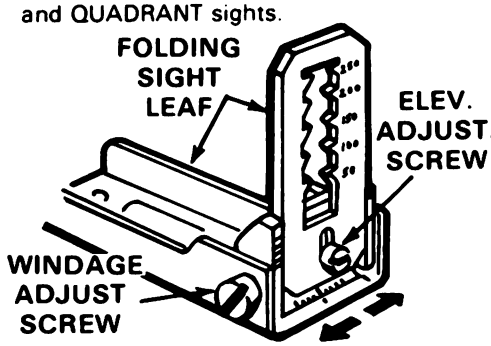
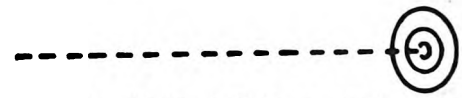
PERFORMANCE MEASURES (cont)

The point is to hit what you are aiming at. So, let's get familiar with the LEAF and QUADRANT sights.



WARNING: The 50-meter mark on the leaf sight blade is marked in red to emphasize that this range is not to be used in zeroing procedures.



The LEAF SIGHT is used in conjunction with front sight post of the M16A1 rifle and provides range selection from 50 to 250 meters in 50-meter increments.

2. Leaf sight zeroing.

   a. Select a target at 200 meters.

   b. Place the sight leaf in the upright position.

   c. Place the center mark of the windage scale on the index line at the rear of the sight base.

   d. Loosen the elevation adjustment screw on the leaf sight and place the index line of the leaf sight on the center elevation mark on the sight mount.

   e. Tighten the elevation adjustment screw on the sight leaf.

   f. Take a supported prone position.

   g. Align target with the 200-meter increment of the leaf sight and the front sight post of the rifle.

   h. Fire a round, observe the impact, and make the necessary sight adjustment.

      (1) Turning the sight windage screw clockwise moves the strike of the round to the left; turning the windage screw counterclockwise moves the strike to the right. One increment in either direction equals 1-1/2 meters at a range of 200 meters.

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PERFORMANCE MEASURES (cont)

(2) Raising the leaf sight increases range; lowering it decreases range. One increment equals 10 meters at a range of 200 meters.

i. Fire one or more rounds and make necessary adjustments after each round until a round has landed within 5 meters of the target.

j. Fire a confirming round.

3. Quadrant sight zeroing.

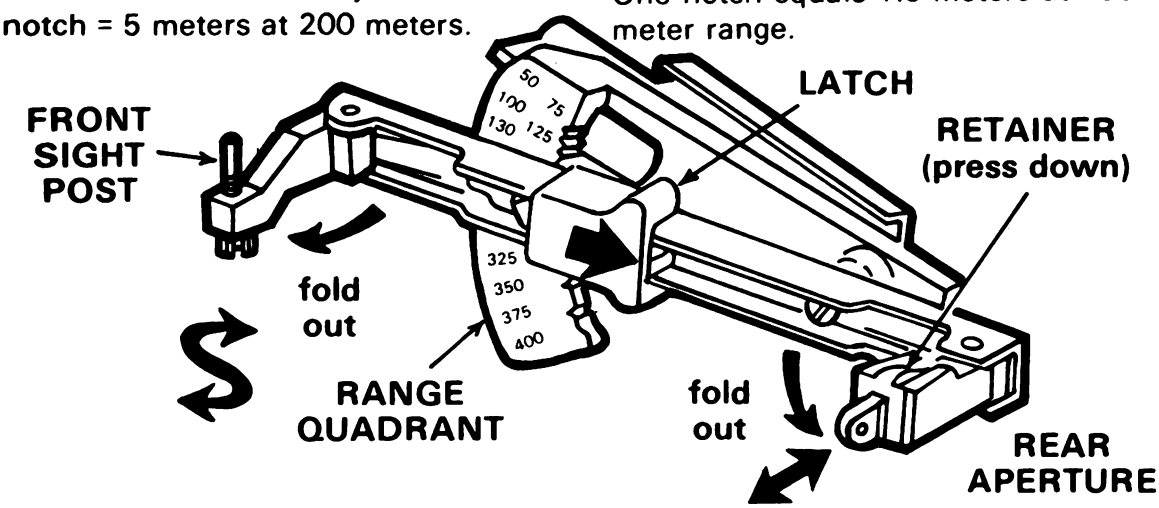
a. Select a target at 200 meters.

b. Make sure the sight is correctly mounted on the carrying handle of the rifle.

c. Move the front sight post and rear sight aperture from the closed to the open position.

The QUADRANT SIGHT attaches to rifle handle/sight and has range from 50 to 400 meters in 25 meter increments. Elevation adjustment: 1 notch = 5 meters at 200 meters.

The rear aperture slides in or out for windage correction by depressing retainer. Vertical line denotes center. One notch equals 1.5 meters at 200-meter range.



Turn front sight post right for less elevation and left for more elevation.

Slide in to move strike of projectile right; Slide out to move strike left.

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PERFORMANCE MEASURES (cont)

(1) Depress the rear sight retainer and slide the rear sight aperture to the left or right until the wide index line of the rear sight aperture is aligned with the edge of the sight aperture arm.

(2) Move the front sight post to its highest position and then back off 2-1/2 turns.

d. Move the sight latch rearward and reposition the quadrant sight arm to zeroing range (200 meters).

e. Take a supported prone position.

f. Align the target with the front and rear sights, using correct sighting and aiming procedures.

g. Fire a round, observe the impact, and make the necessary sight adjustment.

(1) For range adjustment, turn the front sight post clockwise to decrease range and counterclockwise to increase range. One full turn equals 5 meters at a range of 200 meters.

(2) For windage adjustment, press the sight aperture retainer and move the rear sight aperture away from the barrel to move the trajectory of the projectile to the left. Move the rear sight aperture toward barrel to move the trajectory to the right. One notch on the rear sight aperture equals 1 1/2 meters at a range of 200 meters.

h. Fire one or more cartridges and make the necessary adjustments after each round. When a round has landed within 5 meters of the target, the weapon is zeroed.

i. Fire a confirming round.

Note. If the individual has not zeroed after firing five rounds, his weapon will be inspected to be sure it is assembled and functioning properly. After the weapon is checked the individual may be given another opportunity to zero.

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TASK SUMMARY 071-311-2103 (cont)

PERFORMANCE MEASURES (cont)

REFERENCES

FM 23-31, 40-mm Grenade Launcher, M203 and M79, chap 6, pp 6-12, 6-13, para 6-18 thru 6-21.
TM 9-1010-221-10, Operator's Manual 40-mm Grenade Launcher M203, pp 16 thru 19, and 24.
TEC 940-071-0088-F, The M203 Grenade Launcher: Zeroing and Target Engagement.

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ENGAGE TARGETS WITH AN M203 GRENADE LAUNCHER AND APPLY IMMEDIATE ACTION TO REDUCE A STOPPAGE

CONDITIONS

On a live fire range, given 7 practice rounds, 1 unmarked dummy round, an M203 grenade launcher, instructions to load and engage 4 targets until all ammunition is expended, and targets consisting of:

POSITION	TARGET	RANGE
Kneeling Supported	Window (.75m wide x 1m high)	90-100 m
	Bunker (1m high x 1.5m wide)	105-115 m
Foxhole Supported or	Troops in an Open Emplacement	275-300 m
Bunker Supported	Troops in the Open	324-350 m

STANDARDS

Within 6 minutes, hit 3 of the 4 targets apply immediate action to reduce any stoppage. A hit consists of:

1. Placing a round through the window.
2. Hitting the front of the bunker.
3. Hitting within 5 meters of troops in an open emplacement.
4. Hitting within 5 meters of troops in the open.

PERFORMANCE MEASURES

1. Sighting consists of sight alignment and getting a sight picuture (fig 1).
2. Aiming.
   a. The firer obtains a correct sight alignment and then shifts his focus to the target for a correct sight picture. As the trigger is pressed, he continues shifting eye focus.

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PERFORMANCE MEASURES (cont)

b. Firer should use controlled breathing just as he would when firing the rifle.

3. Pointing technique. To use the pointing technique, bring the weapon to a modified underarm firing position. With both eyes open, concentrate your vision on the target, keeping the flash suppressor of the rifle in the lower part of your field of view. Point the flash suppressor of the rifle at the target and sense the elevation of the weapon with respect to the range to the target. To make corrections in elevation and deflection, sense the impact of the round and make appropriate changes in the position of the weapon.

4. Sensing.

a. Sensing is an instantaneous determination by the grenadier as to where the grenade explodes with respect to the target. Sensings are made in both range and deviation to the nearest 5 meters since the casualty radius of the HE round is 5 meters.

b. Range sensings are made as follows:

(1) Short--if the grenade bursts between the grenadier and target.

(2) Over--if the burst is over the target.

(3) Target--grenade hits any portion of target.

(4) Range correct--the grenade is slightly left or right of the target, but at correct range.

(5) Doubtful--grenade is at correct range, but grenadier cannot make a positive sensing.

c. Deviation sensings are RIGHT, LEFT, or LINE.

5. Firing.

WARNING: Make certain there are no obstacles (sling, branches, etc.) in the line fire.

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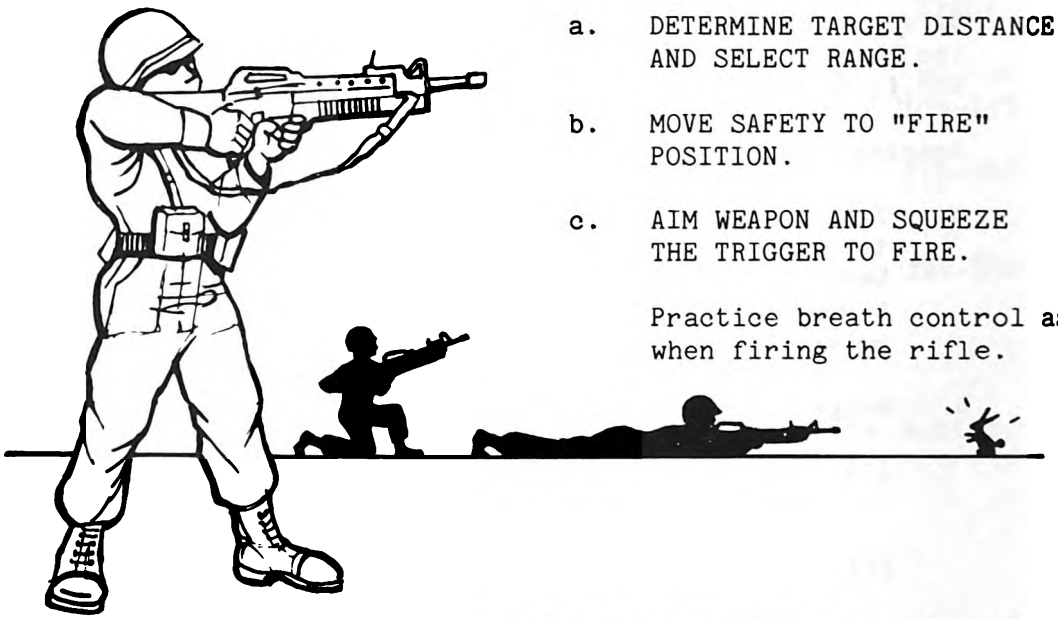
PERFORMANCE MEASURES (cont)



a. DETERMINE TARGET DISTANCE AND SELECT RANGE.

b. MOVE SAFETY TO "FIRE" POSITION.

c. AIM WEAPON AND SQUEEZE THE TRIGGER TO FIRE.

Practice breath control as when firing the rifle.

Note. When firing long range from the prone position, place the stock of the weapon on the ground. For all other positions hold the stock firmly against your shoulder.

6. Adjustment of fire.

a. Adjustment of fire is the action taken by the grenadier using sensing, sight manipulation, and an adjusted aiming point to insure a second round hit.

b. When using the sight leaf, the grenadier simply changes his sight alignment or uses an adjusted aiming point.

c. If the first grenade impacts more than 25 meters over or short of the target, adjust the range quadrant to bring the next grenade on target.

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PERFORMANCE MEASURES (cont)

c. Exercise extreme caution during unloading procedures; where circumstances permit, either catch the ejected round or reduce the distance it falls by holding the weapon close to the ground.

d. After the round has been removed from the receiver, determine whether the round or the firing mechanism is defective. Examine the primer to see if it has been dented. If the primer has not been dented, the firing mechanism is at fault. The round may be reloaded and fired after the cause of failure to fire has been corrected.

e. If the primer has been dented, keep the round separate from other ammunition until it can be properly disposed of.

f. Shouting "MISFIRE" should apply only to training situations.

HANGFIRE: IS A DELAY IN THE PROPELLANT CHARGE IGNITING.

MISFIRE: IS A FAILURE TO FIRE AND WILL BE HANDLED SAME AS A HANGFIRE.

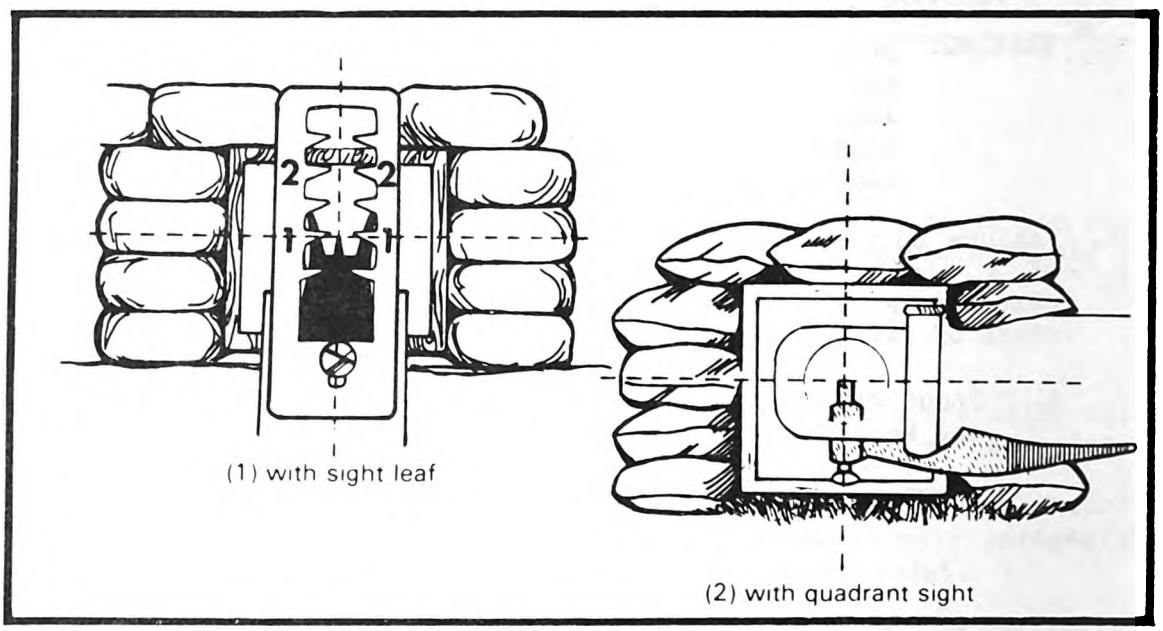

Figure 1. Correct sight alignment.

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TASK SUMMARY 071-311-2104 (cont)

PERFORMANCE MEASURES (cont)

Malfunction	Probable Cause	Corrective Action
Failure to fire	Safety on.....	Place in FIRE position.
	Empty chamber.....	Load weapon.
	Faulty ammunition...	Reload.
	Water or excess lubricant in firing pin well.....	Hand cycle weapon several times to include pulling the trigger.
	Worn or broken firing pin.....	Replace.*
	Dirt or residue in firing pin receess.	Clean.
	Burned sear on firing pin.....	Replace.*
	Dirty firing pin well opening.....	Clean firing pin well opening.*
	Weak or broken firing pin spring.....	Replace.*
Failure to cock	Broken sear.....	Replace.*
	Improper assembly of cocking lever.....	Reassemble.*
	Loose, broken, or missing cocking lever spring pin.....	Replace.*
Failure to lock	Excess plastic on breech end of barrel assembly.....	Trim excess plastic until barrel assembly will lock.*
	Dirty follower assembly or receiver cavity...	Clean.
Failure to chamber	Faulty ammunition.....	Reload.
	Dirty chamber.....	Clean bore and chamber.

Figure 2.

*Procedures to be accomplished by DS/GS maintenance.

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TASK SUMMARY 071-311-2104 (cont)

PERFORMANCE MEASURES (cont)

Malfunction	Probable Cause	Corrective Action
Failure to extract	Defective extractor on spring or spring pin.	Replace.*
	Ruptured cartridge case.....	Remove from barrel.
Failure to eject	Worn, broken, or missing spring or retainer....	Replace.*
Safety fails to stay in position	Broken or worn safety or missing spring pin.	Replace.*
Sight will not stay in selected position	Sight mounting machine screw loose.....	Tighten screw or replace if dented or broken.

*Procedures to be accomplished by DS/GS maintenance.

Figure 2 (cont).

REFERENCES

FM 23-31, 40-mm Grenade Launcher, M203 and M79, chap 6, sec II, p 6-1.
TM 9-1010-221-10, Operator's Manual 40-mm Grenade Launcher M203, pp 17, 22, and 25.
TEC 940-071-0088-F, M203 Grenade Launcher: Zeroing and Target Engagement.

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PREPARE AN M72A2 LAW FOR FIRING; RESTORE AN M72A2 LAW TO THE CARRYING CONFIGURATION

CONDITIONS

Given an M72A2 LAW.

Note. Expended LAW may be used.

STANDARDS

1. Prepare for firing:

   a. Within 30 seconds, conduct a visual prefiring safety inspection. Do not extend/fire damaged LAW.

   b. Within 30 seconds, extend the launcher and lock in position, check backblast area, place the launcher on the shoulder in firing position, and move the safety handle to ARM.

2. Restore to carrying configuration: Place on SAFE with the launcher tube collapsed, sights in down position, and sling assembly and pull pin replaced.

PERFORMANCE MEASURES

1. Prepare the launcher for firing:

   a. Inspect the M72A2 LAW to be sure that all seals are intact and that the tube has not been cracked, punctured, or crushed. Check the pull pin and trigger safety handle to verify proper placement. Damaged LAWs should not be fired.

      WARNING: Check data plate on launcher for words "with coupler." If these words are not on the data plate do not attempt to fire the weapon.

   b. Remove the pull pin and rotate the rear cover downward (fig 1, A), allowing the front cover and sling assembly to fall free. Do not discard the sling asembly until the rocket is fired.

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PERFORMANCE MEASURES (cont)

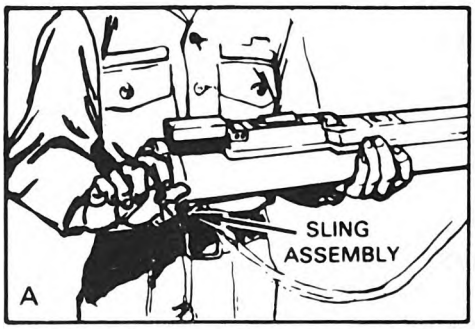
c. Extend the launcher by grasping the rear sight cover and sharply pulling the launcher to the rear until locked into position (fig 1, C). Attempt to collapse the launcher by reversing the motion of your hands to verify it is locked into position.

d. Place the weapon on the shoulder (fig 2, A).

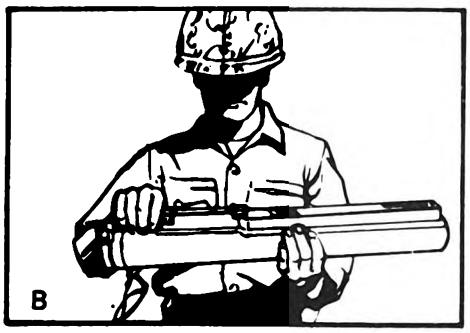
e. Check the backblast area (fig 2, B). If soldiers are in the backblast area, warn them and wait for them to get out of the area before arming the launcher.

f. Move the safety handle to ARM (fig 2, B) once the backblast area is clear.

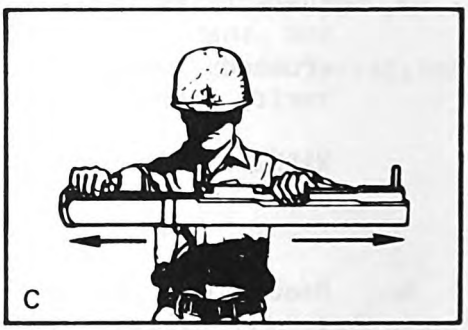
CAUTION: Once the weapon is placed on the shoulder, keep it pointed up and down range.



REMOVAL OF SLING ASSEMBLY



PREPARING TO EXTEND LAUNCHER



LAUNCHER EXTENDED

Figure 1. Preparation/extending launcher.

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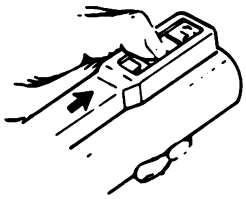
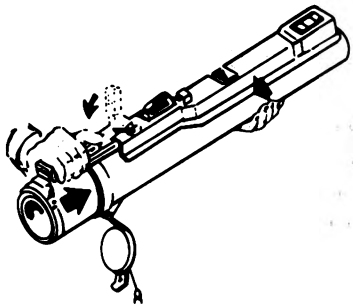
PERFORMANCE MEASURES (cont)



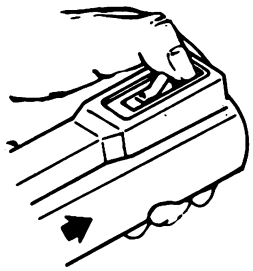
COMPLETE ALL COMPRESSION ACTIONS SLOWLY TO AVOID INJURY TO FINGERS

h. Fold down the rear sight and guide under housing.



i. Compress the launcher until travel is stopped by lip on front sight.

j. Press the front sight lip with your thumb and slowly compress the launcher over lip edge.



k. Remove your thumb from front sight and grasp the housing.

l. Close the launcher fully.

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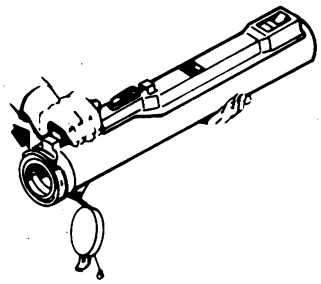
PERFORMANCE MEASURES (cont)



m. Close the rear cover, making sure the round lock fits through the slot in the cover.

n. Replace the cover pull in.

Note. The cover pull pin should be inserted from right to left with the short end through the cover closing lug and the long end through the round lock which protrudes through the rear cover.

REPLACE COVER PULL PIN

o. Replace the front cover and hold in place.

p. Replace the sling assembly. Grasp both web straps of the sling assembly next to the hook springs and place thumb on the rear cover above the hinge. Exert downward pressure with the thumb while pulling up on the sling assembly until the hooks snap into position over the cover hinge.

Note. Using the rear cover as a lever to assist in attaching the sling assembly will damage the cover hinge.

REFERENCES

FM 23-33, 66-mm HEAT Rocket M72A1, M72A1E1, and M72, C1 and 2, chap 4, p 16, para 19.
TEC 948-071-0005-F, Operating the M72A2 LAW.

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ENGAGE TARGETS WITH AN M72A2 LAW

CONDITIONS

During daylight, on a suitable firing range, given an M190 subcaliber device and seven M73 rockets (three rounds for stationary target phase and four rounds for moving target phase) a series of stationary targets located between 75 and 200 meters from the firer which will be presented in a combination of frontal, flank, or oblique views, and a moving (6 to 24 kmph (4 to 14 mph)) target presented in a flank view between 75 and 165 meters from the firer.

STANDARDS

Firer will achieve:

1. Two target hits of three rockets fired at stationary targets.

2. Two target hits of four rockets fired at moving targets.

PERFORMANCE MEASURES

1. Sights.

   a. Rear sight. The rear sight consists of a flip-up peepsight. The sight should be as close to the eye as possible and the front sight viewed through the peep when sighting (aiming).

   b. Front sight (fig 1). The front sight is a clear plastic flip-up leaf. On the sight there is a vertical range line with ranges from 50 to 350 meters indexed in 25-meter increments, two curved stadia lines (LAW stadia lines are not accurate and are no longer used), and lead crosses.

2. Estimating range. The first step in target engagement is to determine the range to the target. This should be done using visual range estimation (see Task Summary 071-326-0508, Determine Range to a Target) aided by the use of a range/sector card. A range/sector card is a rough drawing of the terrain in your

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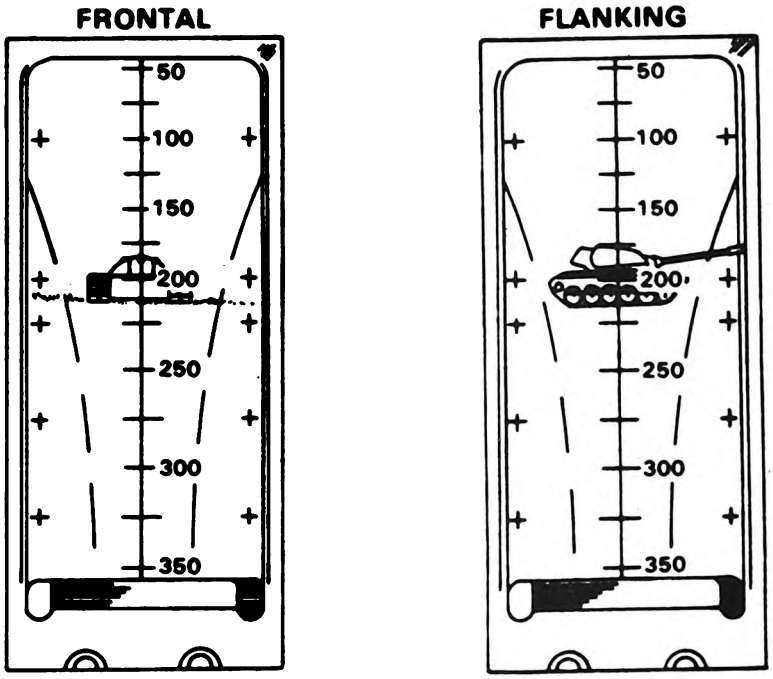
PERFORMANCE MEASURES (cont)

(2) Placing that point on the center of target mass (fig 2).

(3) Fire.

Note. Consider all front/rear views as stationary targets, even if moving.



2A 2B

Figure 2. Stationary targets at an estimated range of 200 meters.

b. Moving targets. After determining the range, you sight on moving targets by:

(1) Estimating target speed as slow or fast (see table 1).

(2) Applying appropriate lead, using lead cross directly opposite estimated range, and

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PERFORMANCE MEASURES (cont)

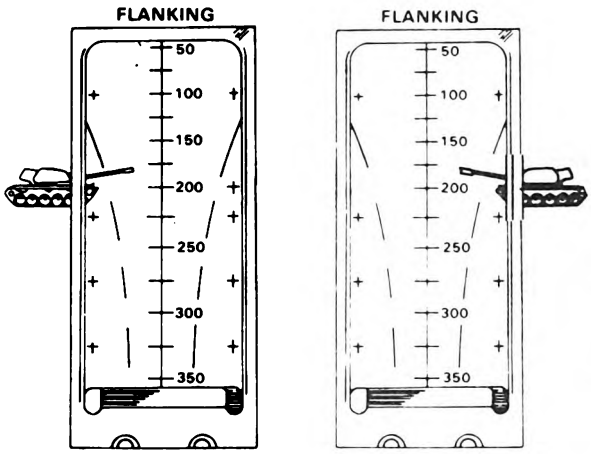

Figure 4. Fast target at a range of 200 meters.

(3) Fire.

Note. If there is no lead cross at your estimated range, use an imaginary lead cross which aligns with those present on the sight.

4. Trigger squeeze. The trigger is a bar located on top of the launcher. To fire, press straight down. Apply a steady, smooth squeeze downward with your fingertips only.

REFERENCES

FM 23-33, 66-mm Heat Rocket M72A1, M72A1E1, M72

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APPLY IMMEDIATE ACTION TO CORRECT A MALFUNCTION ON AN M72A2 LAW

CONDITIONS

During daylight or darkness, in a field location, given an M72A2 LAW; an attempt to fire the weapon having resulted in a misfire.

STANDARDS

Within 3 minutes, apply immediate action and attempt to fire the LAW. If the weapon still fails to fire, dispose of the weapon in accordance with unit SOP.

Note. Time factors and safety precautions apply only to training.

PERFORMANCE MEASURES

1. Immediate action (training only).

   a. Resqueeze the trigger bar. If round does not fire, shout "MISFIRE," wait 10 seconds.

   b. Place trigger safety handle on SAFE while keeping LAW trained on the target, then remove from shoulder.

   c. Wait 1 minute, depress detent and collapse launcher about 4 inches.

   d. Re-extend launcher and place it on shoulder.

   e. Check backblast area.

   f. Arm, aim, and attempt to fire.

   g. If LAW fails to fire after use of immediate action (training only):

      (1) Keep LAW aimed at target for 10 seconds.

      (2) Place LAW on SAFE and keep it aimed on target for 1 minute.

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PERFORMANCE MEASURES (cont)

(3) Do not collapse launcher.

(4) Dispose of launcher as directed by unit SOP.

2. Immediate action (combat only).

a. Immediately resqueeze the trigger bar if round does not fire.

b. Return the arming handle to SAFE.

c. Remove LAW from shoulder, collapse and re-extend (keeping hands clear of the front and rear tube openings).

d. Replace the LAW on shoulder.

e. Check the backblast area.

f. Arm, aim, and attempt to fire.

g. If the LAW still fails to fire, return to SAFE, remove from shoulder, collapse the tube (this keeps the firing mechanism from functioning) and discard.

Note. DO NOT LEAVE an intact LAW on the battlefield. The enemy can and will use it against you.

h. If another LAW is available, try to engage the target if it is still in range or poses a threat to your unit.

Note. If an M190 subcaliber device was used in training, an instructor or safety NCO should examine the primer housing lock pin to make sure that the bent position of the lock pin is pushing againt the primer housing door. This is to be done after the first 1-minute wait is completed. After the second failure to fire and its subsequent 1-minute wait, remove the M73 and examine the primer cap. If the primer cap is dented, a rocket malfunction has occurred, and if the primer cap is not dented, the launcher has malfunctioned.

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REFERENCES

FM 23-33, 66-mm HEAT Rocket M72A1, M72A1E1, and M72, chap 2, pp 10 and 11, para 13.
TEC 948-071-0005-F, Operating the M72A2 LAW.

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ACQUIRE AND ENGAGE TARGETS WITH AN M60 OR M60D MACHINEGUN USING AN AN/PVS-2 NIGHT VISION SIGHT

CONDITIONS

During hours of darkness in clear weather, given fifty rounds of link ammunition (4-in-1), a firing range with linear targets located 300 to 500 meters downrange, and either of the following weapons:

1. An AN/PVS-2 zeroed and mounted on an M60 machinegun (either bipod or tripod mounted).

2. An AN/PVS-2 zeroed and mounted on an M60D machinegun.

STANDARDS

1. Acquire and engage targets using the AN/PVS-2 in accordance with the performance measures.

2. Fire 10 rounds at each target acquired.

PERFORMANCE MEASURES

1. Turn the AN/PVS-2 on and place the rubber eye shield to your eye (fig 1, item 11).

2. Focus the aiming reference point using the diopter scale focus (fig 1, item 10).

3. Adjust the range focus ring for a sharp image. During surveillance, adjust the range focus to get a sharp image at different ranges. Focus the target image using the objective lens focus ring (fig 1, item 1).

4. Sight through the scope and position the aiming reference point center of base of target.

   Note. When operating the sight at night, care must be taken to make sure the eye is held firmly against the rubber eyeshield to prevent light leakage. The light reflected on the operator's face can be detected by the enemy.

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REFERENCES

TM 11-5855-203-13, Operator's Manual: Night Vision Sight, AN/PVS-2, chap 2, sec III, pp 36 and 37, para 2 thru 21.

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OPERATE AN M60/M60D MACHINEGUN

CONDITIONS

Given a fully assembled and cleared M60/M60D machinegun and 20 rounds of linked 7.62-mm blank or live ammunition.

STANDARDS

Perform loading, reduction of a stoppage, and clearing of an M60 machinegun in accordance with the performance measures listed below.

Note. The M60/M60D machinegun is loaded, fired, unloaded, and cleared in the open-bolt position. The safety must be placed on the FIRE position before the bolt can be pulled to the rear.

PERFORMANCE MEASURES

1. Loading (FM 23-67, C1, chap 4, p 40, para 35 and 36).

   a. Place the safety switch in the FIRE position.

   b. Pull the cocking handle to the rear, locking the bolt in the rear position.

   c. Return the cocking handle to the forward position and place the safety switch in the SAFE position.

   d. Raise the feedtray cover and make sure the feedtray, receiver, and chamber are clear.

   e. Place the first round of the belt in the feedtray groove and close the feedtray cover, making sure the round remains in the feedtray groove.

2. Reduction of a stoppage (FM 23-67, C1, chap 5, p 49, para 42).

   a. A stoppage is an interruption in the cycle of functioning, caused by faulty action of the gun or faulty ammunition. Immediate action is the action taken to reduce the stoppage without investigating the cause.

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PERFORMANCE MEASURES (cont)

b. For training purposes, if a live fire range or blank ammunition cannot be obtained, then a stoppage should be simulated by the trainer. The soldier may then be required to perform immediate action or state in his own words how he would apply immediate action.

c. Immediate action.

(1) If a stoppage occurs, pull the cocking handle to the rear, locking the bolt to the rear, and return the cocking handle to the forward position.

(2) If a round is ejected, try to fire again.

(3) If a round does not eject, immediate action has failed and remedial action must be taken.

d. Remedial action.

(1) Unload and clear the gun.

(2) Inspect the gun and ammunition to determine the cause of the stoppage.

(3) If possible, correct the cause of the stoppage, reload, and attempt to fire the gun.

(4) If the problem remains, the gun must be turned in to the unit armorer.

TRAINING TIPS: For an explanation of reduction of other kinds of stoppages, the soldier should refer to FM 23-67, C1, chap 4, p 50, table II.

3. Clearing (FM 23-67, C1, chap 4, p 40, para 38).

a. To clear the gun, it must first be unloaded. To unload the gun, pull the cocking handle to the rear, locking the bolt in the rear position. Return the cocking handle to the forward position and place the safety switch on the SAFE position. Open the feedtray cover and remove any ammunition or belt links which may remain in the gun (FM 23-67, C1, chap 4, p 40, para 37).

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PERFORMANCE MEASURES (cont)

b. To clear the gun:

(1) Check the cover, feedtray, receiver, and chamber to make sure they are clear of all ammunition.

(2) Close the feedtray cover.

(3) Place the safety switch on the FIRE position.

(4) Pull the cocking handle to the rear, pull the trigger, and simultaneously ease the bolt forward by riding the cocking handle forward.

(5) Place the safety switch on the SAFE position.

REFERENCES

FM 23-67, Machinegun 7.62-mm, M60, C1.
TEC 941-071-0078-F, The M60 Machinegun: Mechanical Training, Part I.
TEC 941-071-0079-F, The M60 Machinegun: Mechanical Training, Part II.
TEC 941-071-0080-F, The M60 Machinegun: Mechanical Training, Part III.
TEC 941-071-0081-F, The M60 Machinegun: Functioning.
TEC 941-071-0083-F, The M60 Machinegun, Prefire Procedures.
TEC 941-071-0085-F, Malfunctions and Stoppages, M60 Machinegun.

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PERFORM OPERATOR MAINTENANCE ON AN M60 MACHINEGUN AND AMMUNITION

CONDITIONS

Given a 7.62-mm M60 machinegun with all components, a cleaning kit, cleaning solvent (CR), rifle bore cleaner (RBC), lubricant, rags, and patches.

STANDARDS

1. Within 4 minutes, disassemble the M60 into its eight major groups in accordance with performance measure 1 below.
2. Perform cleaning, inspection, and lubrication of the M60 and tripod in accordance with performance measures 2 and 3 below.
3. Within 4 minutes, reassemble the M60 and conduct a function check in accordance with performance measure 4 below.
4. Clean M60 ammunition, if required, in accordance with performance measure 5 below.

PERFORMANCE MEASURES

1. Disassemble the M60. The machinegunner will disassemble the M60 into its eight major groups: stock group, buffer and operating rod group, bolt assembly, trigger mechanism group, barrel group, cover tray and hanger group, forearm assembly, and receiver group (fig 1). Disassembly begins with the bolt forward, the cover closed, and the safety switch on SAFE.

   CAUTION: Before the weapon is disassembled it must be cleared.

   a. Remove the stock group.

      (1) Raise the hinged shoulder rest and insert the nose of a cartridge into the latch hole (fig 2).

      (2) With the latch depressed, remove the stock group by pulling it directly to the rear.

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PERFORMANCE MEASURES (cont)

The buffer and operating rod group consists of the buffer retaining yoke, buffer, driving spring guide assembly, driving spring, and the operating rod assembly (fig 1).

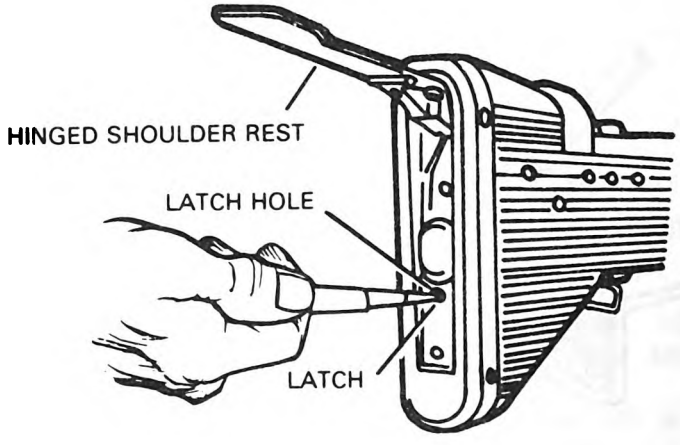

Figure 2. Removing the stock group.

(1) Press lightly with the palm of the hand against the exposed buffer. Remove the buffer retaining yoke from the top of the receiver (fig 3).

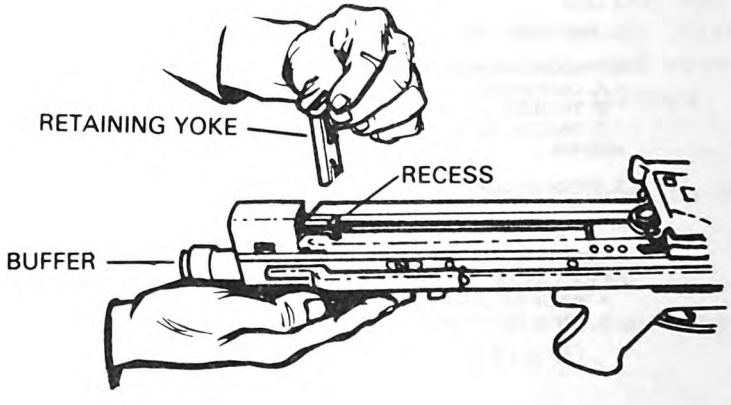

Figure 3. Removing the buffer group.

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PERFORMANCE MEASURES (cont)

(3) Slide the trigger mechanism group slightly forward, rotate the front of the housing down, and remove it (fig 9).

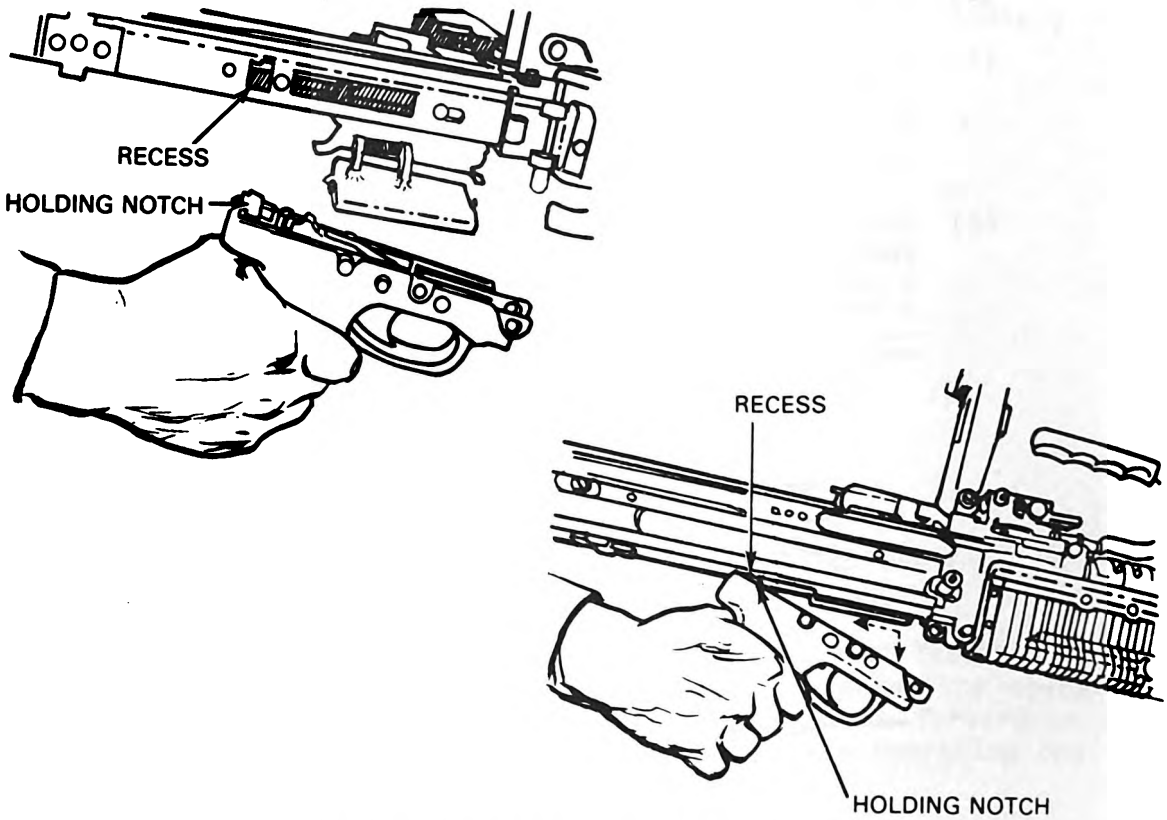

Figure 9. Removing the trigger housing group.

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PERFORMANCE MEASURES (cont)

d. Remove the barrel group. The barrel group consists of the barrel, flash suppressor, front sight, bipod assembly, and the gas system.

(1) Push in on the barrel locking lever plunger and raise the barrel locking lever to the vertical position (fig 10).

(2) Remove the barrel group by pulling it straight to the front.

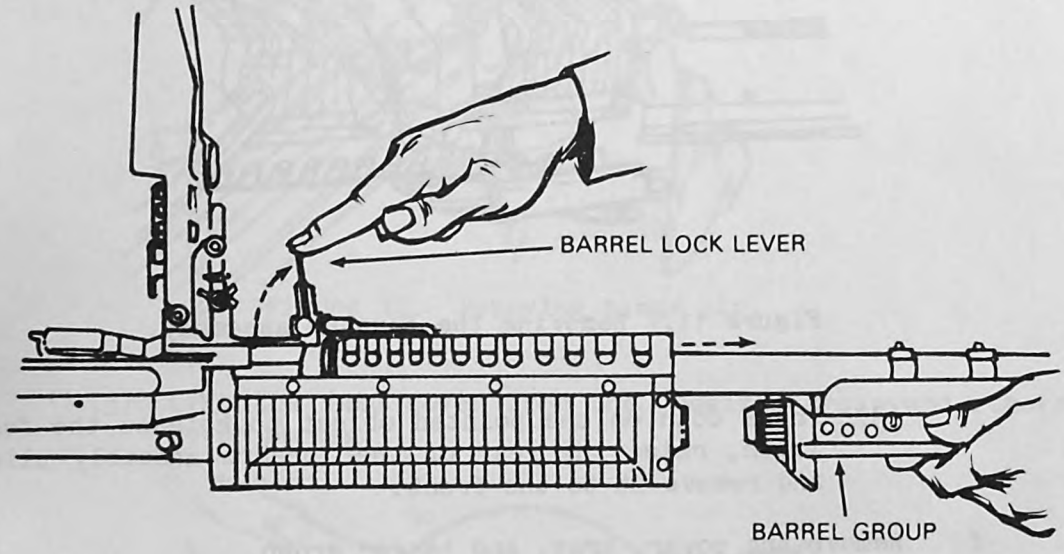

Figure 10. Removing the barrel group.

e. Remove the forearm assembly.

(1) Turn the receiver so that the top is down.

(2) Insert a pointed object into the latch hole at the bottom rear of the forearm assembly (fig 11).

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PERFORMANCE MEASURES (cont)

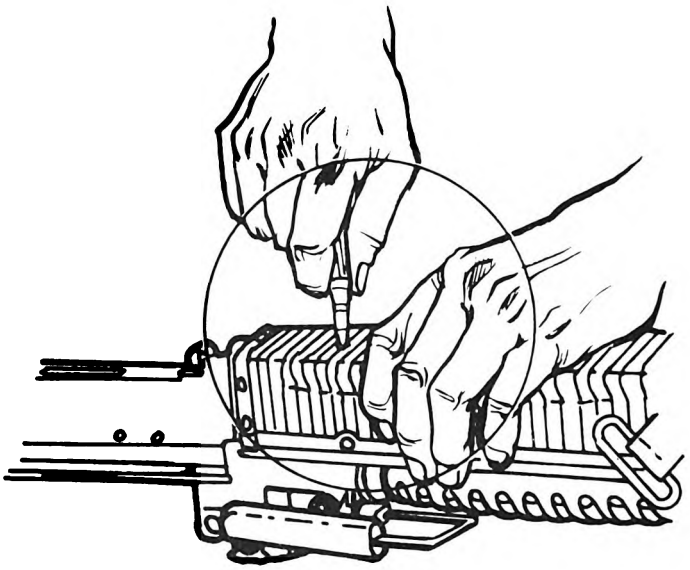

Figure 11. Removing the forearm assembly.

(3) Press down on the pointed object to release the forearm latch, raise the rear of the forearm assembly slightly and remove it to the front.

f. Remove the cover, tray, and hanger group.

(1) With the feed cover raised, use a pointed object and unlock the hinge pin latch, and push it out of its recess (fig 12).

(2) Remove the hinge pin by pulling it from left to right.

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PERFORMANCE MEASURES (cont)

g. The receiver group. The receiver group consists of the receiver, rear sight assembly, cocking handle, and carrying handle. General disassembly of the M60 is completed after the removal of the other seven groups from the receiver group.

2. Clean the M60.

a. The M60 machinegun should be kept cleaned at all times. If the gun is not being used for training or firing, it should be inspected weekly and cleaned and lubricated as necessary. At least once every 90 days it should be cleaned as thoroughly as if it were just fired.

b. If the gun has been fired, follow the steps outlined below:

(1) Break the gun down into its eight major groups.

(2) Using a cleaning rod and patch soaked in cleaning compound solvent (CR), swab out the bore several times until most of the powder fouling is removed.

(3) Using a rag soaked in CR, clean the chamber and the bolt until most of the visible powder fouling is removed.

(4) Using a rag soaked in dry cleaning solvent (SD), wipe down all parts of the gun and the tripod with the exception of rubber coated parts.

(5) Dry completely all parts cleaned with SD.

(6) Second day--repeat procedures outlined for day 1.

(7) Third day--

(a) Using a cleaning rod and patches soaked in rifle bore cleaner (RBC), swab out the bore of the gun until all powder fouling is removed. Then swab the bore out with clean patches until it is completely dry.

Note. Be sure to duplicate all bore cleaning steps on spare barrel.

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PERFORMANCE MEASURES (cont)

(b) Using a rag soaked in RBC, remove all remaining fouling in chamber and on bolt surfaces. Then with a clean rag, completely dry the chamber and bolt.

(c) Using a rag soaked in SD, clean all other parts of the gun and tripod except those covered with rubber.

(d) Completely dry all parts cleaned with SD.

c. If the gun has not been fired--

(1) Inspect weekly and clean the gun as outlined in performance measure 2b(7) above.

(2) If the gun has not been fired in the last 90 days, clean it using the complete procedure in performance measure 2b above.

d. Important points to remember.

(1) Do not submerge the buffer group in any cleaning solvents. Clean as prescribed in above outlined procedures.

(2) Use of gasoline, kerosene, benzene, or high pressure water, steam, or air is prohibited for cleaning.

(3) When cleaning the barrel assembly, care should be taken to prevent getting any solvent or oil in the gas cylinder. This is easily done by keeping the barrel in an inverted position while cleaning.

(4) SD is flammable.

e. Lubrication:

(1) Using general purpose lubricating oil (PL special), run a cleaning patch with several drops of PL special on it through the bore.

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PERFORMANCE MEASURES (cont)

(2) Using a rag with several drops of PL special on it, wipe down all surfaces of the gun and tripod with the exception of those covered with rubber, inside the buffer assembly, and inside the gas cylinder.

(3) Specific locations to lubricate with semifluid lubricating oil (LSA) include:

(a) Bolt locking lugs by camming surfaces.

(b) Operating rod surfaces which ride along receiver rails.

(c) Actuator roller on bolt and where bolt actuator rides feed pawl carrier on underside of cover assembly.

f. Special considerations for lubrication must be taken in climates with extreme temperatures (refer to FM 23-67, chap 5, sec II, p 53).

g. Make sure of proper care and use of the barrels.

(1) To prolong the life of the barrels, to retain accuracy, and to allow continuous firing for prolonged periods, two barrel assemblies are issued with each gun.

(2) During continuous firing, change barrels every 10 minutes when firing at the sustained rate of 100 rounds per minute; every 2 minutes when firing at the rapid rate of 200 rounds per minute; and every minute when firing at the cyclic rate which is in excess of 550 rounds per minute.

3. Inspection (machinegun and tripod). A detailed inspection checklist can be prepared by consulting FM 23-67 (w/C1, chap 4, sec II, pp 51 thru 53).

(1) This will give you correct nomenclature.

(2) It will also give you the correct functioning for the various parts.

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PERFORMANCE MEASURES (cont)

4. Assemble the M60. In general assembly, replace the eight major groups in order of disassembly.

   a. Replace the forearm assembly.

      (1) To replace the forearm assembly, guide the forearm assembly over the operating rod tube, making sure the operating rod tube does not strike the baffles inside the forearm assembly. Align the recess in the forearm assembly with the end of the operating rod tube.

      (2) Tap up on the bottom rear of the forearm assembly with the palm of the hand to lock into position.

   b. Replace the cover, tray, and hanger group.

      (1) Replace cover spring.

      (2) To replace the tray and hanger, align the guides to the left of the feed cover counting lugs.

      (3) To replace the cover, insert the cover spring in the well in the receiver group and align the cover with the mounting lugs.

      (4) Insert the hinge pin from the right side and then insert the hinge pin latch from the left side.

   c. Replace the barrel group. Make sure the barrel lock lever is in the vertical position (fig 10). Put the rear of the barrel through the forearm assembly and align the gas cylinder nut with its recess in the forearm assembly. Lower the barrel lock lever.

   d. Replace the trigger mechanism group.

      (1) Engage the holding notch of the trigger mechanism in its recess in the bottom of the receiver (figure 9). Rotate the front of the mechanism up and align the holes of the mechanism with the mounting bracket on the receiver.

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PERFORMANCE MEASURES (cont)

(2) Insert the trigger housing pin from the left. Attach the leaf spring (fig 9) by placing the open end of the leaf spring on the trigger housing pin, and then engage the hooked end to the sear pin.

e. Replace the bolt assembly. With the camming slot up, hold the bolt securely in one hand with the face of the bolt toward the body. With the other hand position the rear of the operating rod yoke against the rear firing pin spool (fig 14). Push on the operating rod, compressing the firing pin spring, and position the operating rod yoke between the firing pin spools. Holding the operating rod and bolt in one hand, proceed to performance measure 4f below.

f. Replace the operating rod group in the receiver.

(1) While holding the operating rod and bolt with one hand, with the other hand push forward on the rear of the bolt, causing the bolt to rotate until the locking lugs are in a vertical position.

(2) With the cam roller up, push the operating rod and bolt into the receiver until the end of the operating rod is even with the rear of the receiver (fig 15).

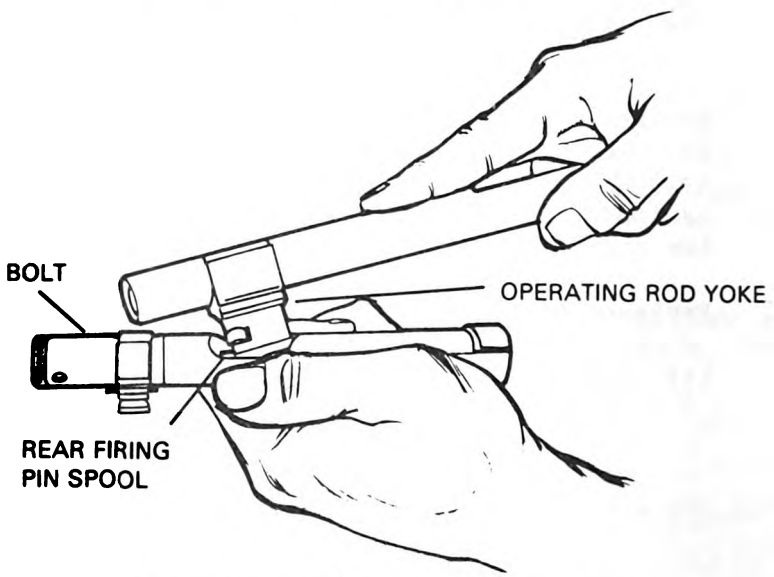

Figure 14. Assembly of the operating group.

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PERFORMANCE MEASURES (cont)

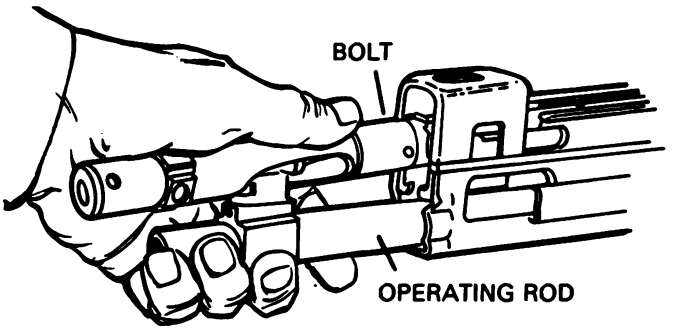

Figure 15. Inserting the operating group in the receiver.

(3) Put the drive spring guide into the drive spring, then put the opposite end of the drive spring in the recess of the operating rod. Pull the trigger and push in the drive spring until the head of the guide is about an inch from the receiver (fig 4).

g. Replace the buffer assembly.

(1) Put the buffer plunger into the drive spring guide (fig 4). Push forward on the buffer until the operating rod and bolt go fully forward.

(2) Push in on the buffer until the recesses on the buffer are aligned with the recesses in the receiver. Replace the buffer retaining yoke from the top of the receiver (fig 3).

h. Replace the stock group. Align the guide rails of the stock with the guide rails on the receiver. Push forward until the stock is fully seated. A distinct click will be heard when the latch engages.

i. Perform a function check. A function check must be performed to make sure the M60 is correctly assembled. Place the safety on FIRE. Pull the cocking handle to the rear, cocking the M60; close the cover, place the safety on SAFE, and pull

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PERFORMANCE MEASURES (cont)

the trigger (should not fire). Place the safety on FIRE and pull the trigger while holding the cocking handle to allow the bolt to ease forward.

5. Ammunition. Ammunition should be clean and dry. One bandoleer should be carried on the machinegun and two bandoleers carried by the machinegunner. All other ammunition remains in the can until needed.

   a. Ammunition containers should not be opened until the ammunition is to be used. Ammunition removed from the air-tight containers, particularly in damp climates, is likely to corrode.

   b. Protect ammunition from mud, dirt, and water. If the ammunition gets wet or dirty, wipe it off prior to use. Wipe off light corrosion as soon as it is discovered. Heavily corroded cartridges or cartridges which have dented cases or loose projectiles should not be fired. Do not expose ammunition to the direct rays of the sun. If the powder is hot, excessive pressure may be developed when the gun is fired.

   c. Do not oil or grease ammunition. If it is oiled, dust and other abrasives will collect on it and damage the operating parts of the gun.

REFERENCES

FM 23-67, Machinegun 7.62-mm, M60 chap 2, sec I thru IV, p 5-30, and chap 4, sec I and II, pp 49 thru 53.
TEC 941-071-0078-F thru 941-071-0080-F, Mechanical Training M60 Machinegun.

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FIELD ZERO AN M60 MACHINEGUN

CONDITIONS

During daylight, on a live-fire range, given a bipod-positioned M60 machinegun, an E silhouette target located at a known range between 300 and 700 meters from the firing position, and a 36-round belt of ammunition.

STANDARDS

Gunner will fire one 6- to 9-round burst, make adjustments, and hit the target with the confirming burst. If the gunner does not hit the target with the confirming burst, he repeats the same procedures treating each subsequent burst as if it were the initial burst until the 36-round belt has been expended.

PERFORMANCE MEASURES

1. During field zeroing, select a target at a known range between 300 and 700 meters.

2. Place the selected range on the rear sight and align the windage index (windage zero).

3. Fire a 6- to 9-round burst at the target and note where the burst hits.

4. Make necessary corrections. One click or one mil on the windage knob moves the line of aim 1 meter at 1000 meters. Adjust deflection by moving the rear sight the necessary number of clicks in the direction of the target.

5. Estimate how high or low you think the center of the beaten zone is hitting in relation to the target and make elevation changes accordingly. New gunners will have to rely on trial and error until they gain sufficient experience to make accurate estimates.

6. After making adjustments, fire a confirming burst. If adjustments were correct, you adjust the range plate so that the correct range is indexed.

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PERFORMANCE MEASURES (cont)

7. If the target is not hit with the confirming burst, repeat the same procedures treating each subsequent burst as if it were the initial burst.

REFERENCES

FM 23-67, Machinegun 7.62mm, M60 w/C 1, chap 10, sec IV, pp 162 thru 163.
TEC 941-071-0084-F, Firing and Zeroing, M60 Machinegun.

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PREPARE A RANGE CARD FOR AN M60 MACHINEGUN

CONDITIONS

During daylight, in a defensive fighting position, given a tripod-mounted M60 machinegun with components, a designated primary sector of fire (FPL optional) and secondary sector of fire (both with recognizable targets), paper, pencil, and lensatic compass.

STANDARDS

1. Within 15 minutes, prepare a range card which includes a data section and a sketch section containing both sectors of fire with appropriate sketches and military symbols to include:

   a. Basic symbol for the machinegun (when a final protective line (FPL) is not assigned).

   b. Final protective line (if assigned).

   c. Limits of the primary sector of fire.

   d. Limits of the secondary sector of fire.

   e. Friendly positions forward of the FEBA.

   f. Eight-digit grid coordinates for the gun position, or a magnetic azimuth and distance from a recognizable terrain feature to the gun position.

   g. Marginal data box in corner of sketch, to include:

      (1) Gun number.

      (2) Unit designation (no higher than company).

      (3) Date.

      (4) A magnetic north arrow properly oriented.

   h. Likely avenues of approach and target areas which may be recognizable man-made objects or natural terrain features.

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PERFORMANCE MEASURES (cont)

(1) Targets will be numbered on the range sketch in order of priority with a data section prepared below the sketch to include direction, elevation, range, description, and remarks on targets, if applicable. When data is placed on the traversing and elevating (T&E) mechanism, the gun will be aimed on the appropriate target.

(2) When assigned, the FPL is target 1. If a principal direction of fire (PDF) is assigned instead of an FPL, it is target 1.

PERFORMANCE MEASURES

1. Range card.

a. The range card:

(1) Permits you to place fires on designated targets during periods of limited visibility (night, fog, smoke, etc.).

(2) Facilities a relief in place by providing the relieving gunner all the information he needs to respond immediately to enemy action.

(3) Provides information to the platoon leader and company commander for inclusion in their fire planning.

b. The preparation of a range card will usually be done while preparing your defensive position. All of the range card, except the data section, will be done before constructing the parapet and digging in, so that fire planning at squad, platoon, and company level can be completed as soon as possible. In addition, it will determine the exact location, shape, and position of your parapet and firing platform. The data section will be completed as soon as the firing platform is dug out and the tripod set in place. Your platoon leader will provide additional guidance for your priority of work based on the situation.

2. Preparation of the range card. The following guidance is based on a situation where the position is prepared and sectors of fire assigned. In situations where the position must also be prepared, the preparation of your range card will take longer since the position must be prepared at the same time. The priority of work will be assigned by your platoon leader.

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PERFORMANCE MEASURES (cont)

a. Orient the card (which could be a field expedient, such as a C-ration boxtop) so that (both) the primary (and, if assigned, secondary) sector of fire can fit on it.

b. Draw a rough sketch of the terrain to the front of the position. Include prominent natural and manmade features which could be likely targets and center the position at the bottom of the sketch.

c. Fill in the marginal data to include:

(1) Gun number (or squad).

(2) Unit designation (platoon and company).

(3) Date.

(4) Magnetic north arrow.

d. Use the lensatic compass to determine magnetic north and sketch in the basic symbol (fig 1) on the card with its base starting at the top of the marginal data section.

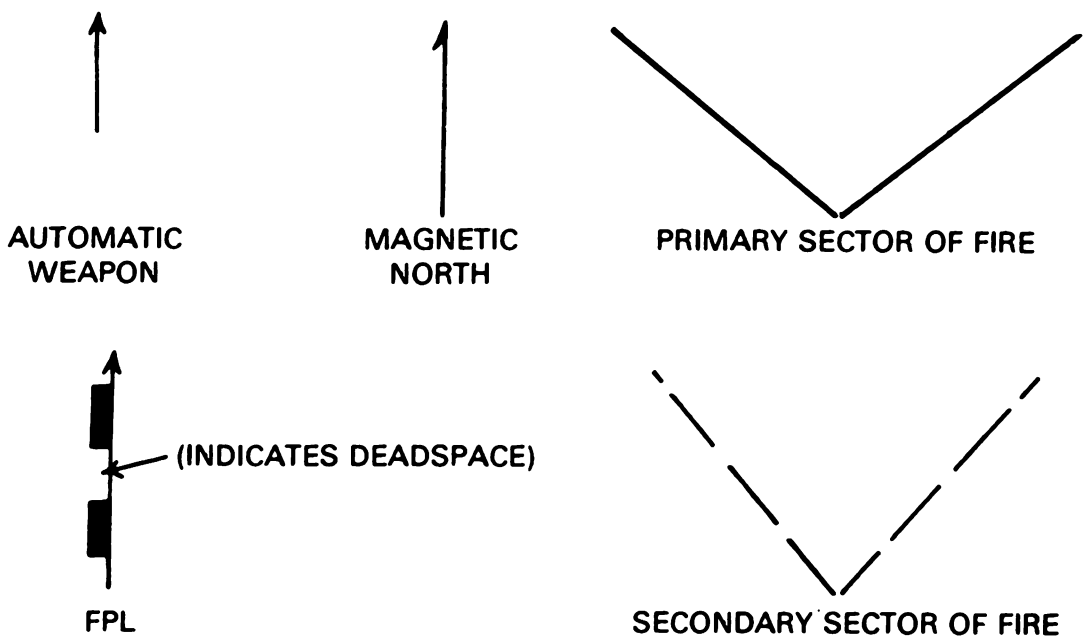

Figure 1. Symbols.

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PERFORMANCE MEASURES (cont)

e. Specify the location of the gun position in relation to a prominent terrain feature. When no such feature exists, place the eight-digit map coordinates of the position near the point on your sketch representing the position (fig 2). If there is a prominent terrain feature within 1,000 meters of the gun, use that feature (fig 3):

(1) Using the compass, determine the azimuth in mils <u>from</u> the terrain feature <u>to</u> the gun position. (Compute the <u>back azimuth</u> from the gun to the feature.)

(2) Determine the distance between the gun and the feature by pacing or from a map.

(3) Sketch in the terrain feature on the card in the lower left or right hand corner (whichever is closest to its actual direction on the ground) and identify it.

(4) Connect the sketch of the position and the terrain feature with a barbed line extending from the feature to the gun.

(5) Write in the distance in meters (above the line).

(6) Write in the azimuth in mils <u>from</u> the feature <u>to</u> the gun (below the line).

f. Sketch in primary sector of fire with a principal direction of fire (PDF) or a final protective line (FPL).

(1) Primary sector with PDF (fig 2).

(a) Sketch in the limits of the primary sector of fire as assigned. (Sector should not exceed 875 mils, the maximum traverse of the tripod-mounted M60.)

(b) Sketch in the symbol for an automatic weapon oriented on the most dangerous target within your sector (as designated by your platoon leader).

(2) Primary sector with an FPL (fig 3).

(a) Sketch in the limits of the primary sector of fire as assigned. (Sector should not exceed 875 mils.)

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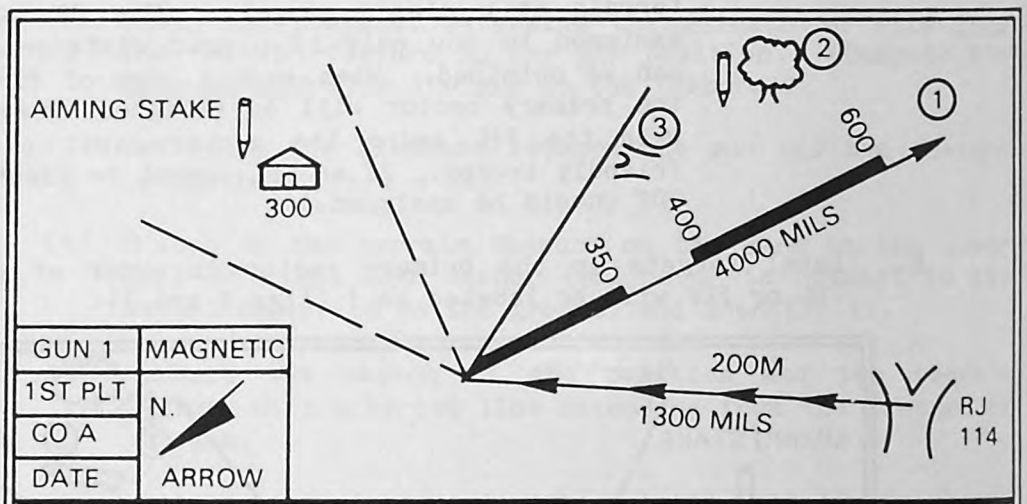
PERFORMANCE MEASURES (cont)

h. Sketch in the secondary sector of fire (as assigned) and label targets within the secondary sector with the range in meters from the gun to each. (The secondary sector will be fired into, when necessary, by using the bipod. The tripod, once emplaced for fire into the primary sector, should not be moved.) Sketch in aiming stakes if they are used.



NO	DIRECTION	ELEVATION	RANGE	DESCRIPTION	REMARK
1		+50/3	600	FPL	-4
2	R 105	+50/40	500	LONE PINE	AIMING STAKE
3	L 235	0/28	350	TRAIL JUNCTION	W15/L7

Figure 3. Range card with final protective line.

3. Preparation of the data section using the T&E mechanism (fig 4).

a. On the reverse side of the card (or below the sketch if there is room), draw a data section block (figs 2 and 3) if you are not using a preprinted card.

b. Preliminary steps:

(1) Center traversing handwheel.

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PERFORMANCE MEASURES (cont)

(2) Read the direction directly off the traversing bar at the left edge of the traversing bar slide (fig 4).

(3) Right or left reading is determined by the direction of the barrel (just the opposite of the slide).

(4) Enter reading under the ELEVATION column of the range card data section by separating the two numbers with a slash (/). Always enter the reading from upper elevating bar. (The fig 4 reading is -50/3.)

d. Read the elevation for each target.

(1) Lay the gun on the base of the target by rotating the elevating handwheel (fig 4).

(2) Read the number (to include + or - sign except for "0") above the first visible line on the elevating scale. (The fig 4 reading is -50.)

(3) Read the number off the elevating handwheel which is in line with the indicator. (The fig 4 reading is 3.)

(4) Enter reading under the ELEVATION column of the range card data section by separating the two numbers with a slash (/). Always enter the reading from the upper elevating bar first. (The fig 4 reading is -50/3.)

e. Enter the range to each target under the appropriate column in the data section.

f. Enter the description of each target under the appropriate column in the data section.

g. Fill in the REMARK column for each target, as needed.

(1) Enter the width and depth (in mils) of linear targets. (The -4 in fig 3 indicates that depressing the barrel 4 mils will bring the strike of rounds down to ground level along the FPL.)

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PERFORMANCE MEASURES (cont)

(2) When entering the width of the target, be sure to give the width in mils and express it as two values. For instance, figure 2 shows target 3 has a width of 7 mils. The second value, R3, means that once the gun is laid on the target, traversing 3 mils to the right will lay the gun on the right edge of the target. Figure 3, target 3, shows the width of the target as 15 mils; traversing 7 mils to the left will lay the gun on the left edge of the target.

(3) Enter AIMING STAKE if one is used for the target.

REFERENCES

FM 23-67, Machinegun 7.62-mm, M60, C1, chap 8, sec IV, p 126-130.
TEC 941-071-0127F and 041-071-0128F, Target Engagement--Limited Visibility, M60 Machinegun.

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ENGAGE TARGETS WITH AN M60 OR M60D MACHINEGUN

CONDITIONS

During daylight on a live fire range suitable for firing the M60 or M60D machinegun and given 50 rounds of linked 7.52-mm ammunition; Type "E" silhouette targets arranged to represent the enemy located at ranges between 300 and 1,100 meters from the firing line position; and either of the following:

1. A zeroed M60 mounted on an M113A1 or bipod.

2. A zeroed M60D mounted on an M48A5.

STANDARDS

Targets will be engaged in accordance with range facilities available and the performance measures.

PERFORMANCE MEASURES

Note. The principles of firing the machinegun from the M113A1 or the M48A5 tank are the same as firing from the bipod except the gunner does not assume a prone position.

1. Assume a stable firing position.

2. Fire the weapon using the correct sight alignment and picture.

   a. Sight alignment. The gunner centers the front sight blade in the aperture of the rear sight slide with the top of the front sight blade even with the top of the right slide (fig 1).

   b. Sight picture. The gunner centers the target over the front sight blade so that it appears to rest on top of the front sight blade and on top of the rear sight slide (fig 2).

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PERFORMANCE MEASURES (cont)

b. If the gunner misses the target with his initial burst about a meter, he selects a new aiming point on the ground the same distance from the target as the center of impact of the initial burst but in the opposite direction, and fires a second burst (fig 4).

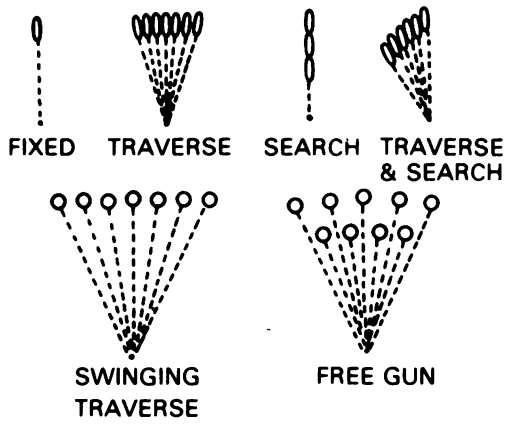

Figure 3.

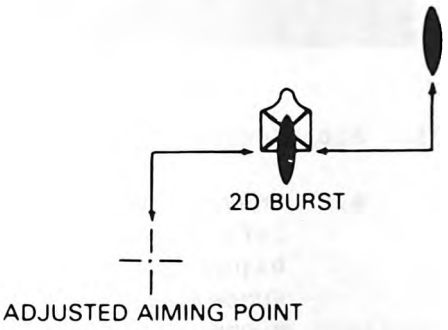

Figure 4.

6. Targets engaged on the battlefield are one of three types: area, point, or moving (FM 23-67, chap 7, para 82 thru 88, pp 92 thru 98).

a. To engage an area target (fig 5):

(1) Determine the width and depth of the target.

(2) Fire single shots until you hit the center of mass of the target area.

(3) Use traversing and searching fire to cover the target area.

b. To engage a point target (fig 6):

(1) Select a distant aiming point.

(2) Estimate range.

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PERFORMANCE MEASURES (cont)

(3) Fire single shots to obtain accurate range and deflection.

(4) Place the beaten zone on target.

(5) If the target moves, follow it.

c. To engage a moving target (fig 7):

(1) Estimate speed of the target and the required lead.

(2) Fire and track as the target moves.

(3) Adjust the lead by observing tracers and bullet strike.

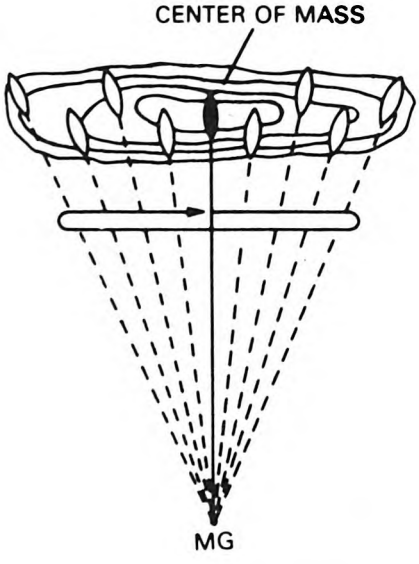

Figure 5.

- Engage a point target.
  - Select a distinct aiming point.
  - Estimate range.
  - Fire single shots to obtain accurate range and deflection.
  - Place the beaten zone on target.
  - If target moves, follow it.

Figure 6.

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PERFORMANCE MEASURES (cont)

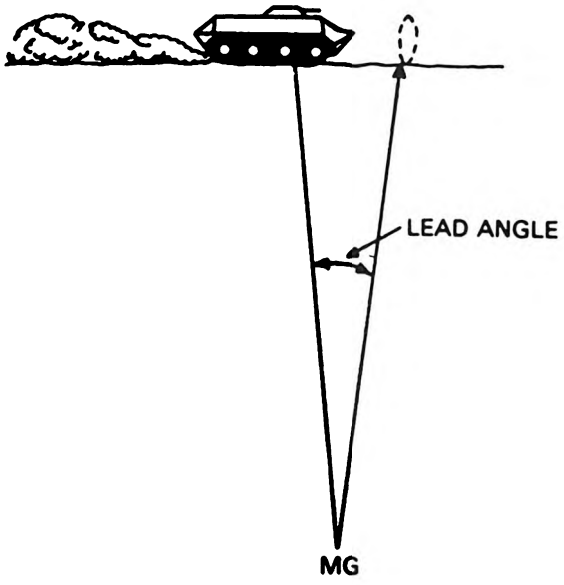

Figure 7.

7. Engage aerial targets:

   a. Push the safety to FIRE.

   b. To engage high-performance aircraft:

      (1) Aim to the front with about a 100-meter lead.

      (2) Fire continuous bursts (fig 8).

   c. To engage low-performance aircraft:

      (1) Aim to the front with about a 50-meter lead.

      (2) Fire continuous bursts (fig 9).

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ACQUIRE AND ENGAGE TARGETS WITH A CALIBER .50 HB M2 MACHINEGUN USING AN AN/TVS-2 NIGHT VISION SIGHT

CONDITIONS

During the hours of darkness in clear weather, given 50 rounds of link ammunition (4-in-1), a suitable firing range with targets located 400 to 600 meters downrange, a boresighted AN/TVS-2 mounted on a caliber .50 machinegun, equipped with a flash suppressor and mounted on an M113A1.

STANDARDS

1. Acquire and engage targets using the AN/TVS-2 in accordance with the performance measures.
2. Fire 6- to 10- round bursts at each target acquired.

PERFORMANCE MEASURES

1. Place the AN/TVS-2 night vision sight into operation.
   a. Place the model 9927 (fig 1) into operation.
      (1) Remove the boresight cover (fig 1, item 1).

      WARNING: Remove the boresight cover only in darkness.

      (2) Place the four-position rotary control switch (fig 1, item 2) in the second (CANT LEVEL) position.
      (3) Pull the slide (fig 1, item 3) to the forward position and observe the cant level bubble (fig 1, item 4) through the cant level view port (fig 1, item 5).
      (4) Center the cant level bubble using the cant level adjustment (fig 1, item 6).
      (5) Place the four-position rotary control switch (fig 1, item 2) in the fourth (SIGHT AND RETICLE) position.
      (6) Look through the eyeshield (fig 1, item 7) for proper image and reticle pattern.

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PERFORMANCE MEASURES (cont)

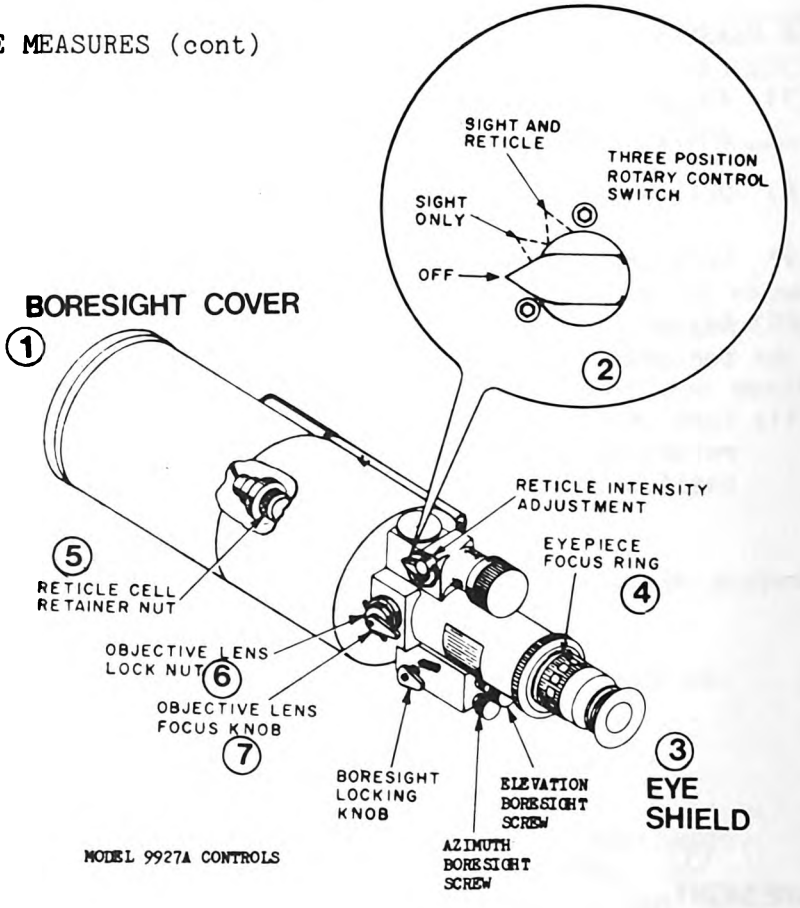

Figure 2. Model 9927A or 9927B.

b. Place model 9927A and 9927B (fig 2) into operation.

(1) Remove the boresight cover (fig 2, item 1).

WARNING: Remove the boresight cover only in darkness.

(2) Place the three-position rotary control switch (fig 2, item 2) in the third (SIGHT AND RETICLE) position.

(3) Look through the eyeshield (fig 2, item 3) for proper image and reticle pattern.

(4) Adjust the eyepiece focus ring (fig 2, item 4) for a sharp reticle pattern.

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PERFORMANCE MEASURES (cont)

(5) Check the vertical alignment of the reticle pattern. If the pattern is not vertical, loosen the reticle cell retaining nut (fig 2, item 5) and rotate the cell until the pattern is vertical. Tighten the retaining nut.

(6) Unlock the objective lens locknut (fig 2, item 6) and adjust the objective lens focus knob (fig 2, item 7) for a clear image.

(7) Lock the objective lens locknut.

(8) Adjust the reticle intensity adjustment (fig 2, item 8) for desired reticle brightness.

(9) Turn off the equipment by placing the three-position rotary control switch (fig 2, item 2) in the first (OFF) position. Replace the boresight cover (fig 2, item 1).

2. Locate targets using the AN/TVS-2 night vision sight.

a. Look through the eyepiece with the eye focused only on the reticle pattern.

b. Adjust the eyepiece focus ring until the reticle data appear sharp and clear.

c. Focus the objective lens on the desired target by rotating the objective lens focus knob.

d. Lock the objective lens knob, taking care not to disturb the focus setting.

Note. When operating the sight at night, care must be taken to be sure the eye is held firmly against the rubber eyesheild to prevent light leakage. Light reflected on the operator's face can be detected by the enemy.

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PERFORMANCE MEASURES (cont)

Training notes.

1. When viewing from open terrain into densely wooded terrain under moonlight or starlight conditions, penetration of the woods is limited to a few meters. The operator may experience difficulty in detecting targets with a dark background.
2. When viewing from open terrain into sparsely wooded terrain under moonlight or starlight conditions, penetration is greatly improved depending on the depth of the woods, height and location of the moon, and the distance of the system from the woods.
3. When viewing from densely or sparsely wooded terrain into open terrain under moonlight or starlight conditions, viewing capabilities are excellent.
4. When operating the sight in open terrain under starlight or moonlight conditions, viewing capabilities are limited only by the ambient light level. The operator will experience little difficulty in target detection or identification under this condition.
5. When using the sight to view on or across water under starlight conditions, the water appears as a void while the objects on the far bank appear as they normally do under starlight conditions.
6. When using the sight to view on or across water under moonlight conditions, the reflection of light from the water greatly increases the viewing capabilities of the sight.
7. Most operators will initially experience eye fatigue after 15 to 30 minutes of continuous observation through the sight.

    a. After using the sight several times within a given period, however, the operator's eyes may become accustomed to the green light, thus allowing him to observe through the sight for longer periods of time.
    b. The operator may also alternate eyes during the viewing procedure to lessen eye fatigue.

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PERFORMANCE MEASURES (cont)

3. Engage targets using the AN/TVS-2.

   a. Acquire the target with the AN/TVS-2.

   b. Remove your eye from the AN/TVS-2.

   c. Hold the weapon steady.

   d. Use the burst-on-target method to engage the target.

      (1) Fire a tracer round, and note the strike of the round in relation to the target by looking through the AN/TVS-2 after you have fired the tracer.

      (2) Note this point on the sight reticle where the strike appears.

      (3) Move this point onto the center of mass of the target.

      (4) Continue this procedure (3a thru 3d(3)) until you have a target hit. Then fire a 6- to 10-round burst.

      Notes on light intensity.

      1. The sight has an automatic cutoff switch incorporated into the image intensifier tube which will deactivate the tube when the light intensity is too high.

      2. Tracer ammunition is recommended for fire adjustment, but should be in a ratio of four ball and one tracer for five rounds when fired from machineguns. Tracer ammunition will deactivate the tube for a fraction of a second; however, this will not affect the operator's ability to adjust fire.

      3. When mounted on the caliber .50 machinegun, muzzle flash will also deactivate the sight unless eliminated by using the flash suppressor.

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TASK SUMMARY 071-313-2316 (cont)

PERFORMANCE MEASURES (cont)

4. Take the AN/TVS-2 out of operation.

   a. Turn the rotating control switch to the OFF position.

   b. Hold your eye to the rubber eyeshield until the light has diminished to avoid having the light reflect on your face.

REFERENCES

FM 23-65, Browning Machinegun Caliber .50 HB M2, chap 3, sec I, p 81, para 15; chap 8, sec II, p 143, para 101.
TC 23-13, Crew-served Weapon Night Vision Sight, chap 3, sec II, p 14, para 22; sec III, p 18, para 27.
TM 11-58-55-202-13, Night Vision Sight: Crew-served Weapons Model 9927 and 9927A, chap 2, p 27, sec III, pp 31 thru 33.

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PERFORM OPERATOR MAINTENANCE ON A CALIBER .50 HB M2 MACHINEGUN AND AMMUNITION

CONDITIONS

During daylight, given a caliber .50 HB M2 machinegun with all components, a cleaning kit, rags, rifle bore cleaner, and special preservative lubricating oil.

STANDARDS

1. Within 50 minutes, perform general disassembly, inspect, clean and lubricate the caliber .50 HB M2 machinegun and M3 tripod mount in accordance with the performance measures below.

2. Assemble the gun and conduct a function check in accordance with the performance measures below.

PERFORMANCE MEASURES

Disassembly, cleaning, inspection, lubricating, and assembly should be conducted in the following manner.

1. Disassembly (fig 1).

   a. Cleaning the gun. Before disassembly, clean the gun as follows:

      (1) Unlock the bolt latch release and raise the cover (if applicable).

      (2) Pull the bolt to the rear and examine the chamber and T-slot to make sure they hold no rounds.

      Note. In darkness, the gunner must feel the chamber and T-slot.

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PERFORMANCE MEASURES (cont)

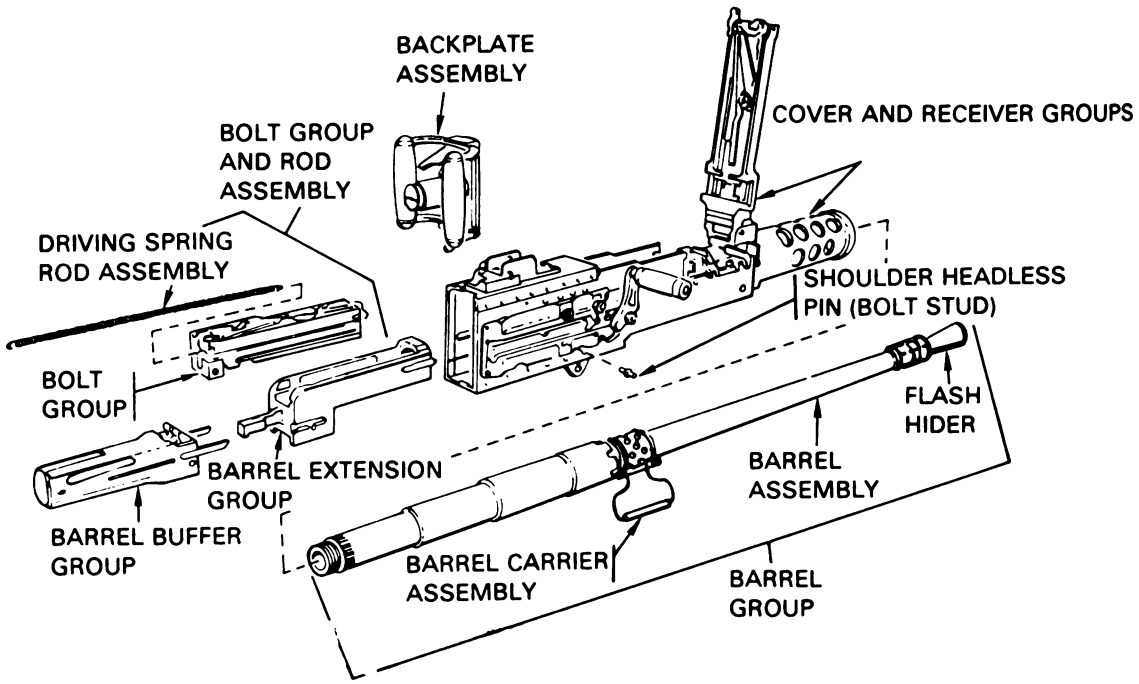

Figure 1.

b. Barrel group. Turn the cover latch shaft lever and raise the cover group. Grasp the retracting slide handle with the left hand, palm down; push the recoiling parts to the rear until the outer lug on the barrel locking spring aligns with the 3/8-inch hole in the right sideplate of the receiver. The barrel can be turned only when the locking lug is aligned with the 3/8-inch hole. Be careful not to damage the threads or barrel locking notches. Unscrew the barrel and place it on the ground. Allow the bolt to go forward slowly. Take care to prevent the bolt group from slamming forward with the barrel removed.

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PERFORMANCE MEASURES (cont)

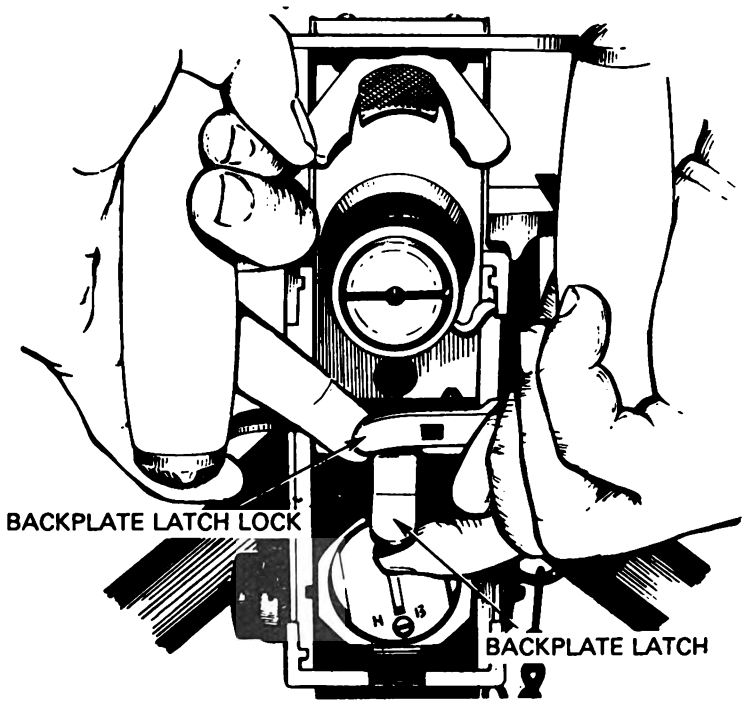

Figure 2.

c. Backplate assembly. To remove the backplate assembly, make sure the bolt latch release is up. If it is not, push down on the bolt latch release and turn the buffer tube sleeve clockwise until the bolt latch releases. The bolt must be forward before the backplate assembly is removed. If the bolt is to the rear, push down on the bolt latch release and let the bolt ride forward by holding the retracting slide handle. The backplate latch and the latch lock are below the buffer tube. Pull out on the latch lock and up on the latch; remove the backplate assembly by lifting it straight up (fig 2).

d. Driving spring rod assembly. The inner and outer driving springs and the spring rod are located next to the right sideplate, inside the receiver. Push in and to the left on the head of the driving spring rod. Pull the driving spring rod assembly to the rear and out of the receiver. A slight pressure is exerted on the driving spring when the bolt is forward; however, never attempt to cock the gun while the

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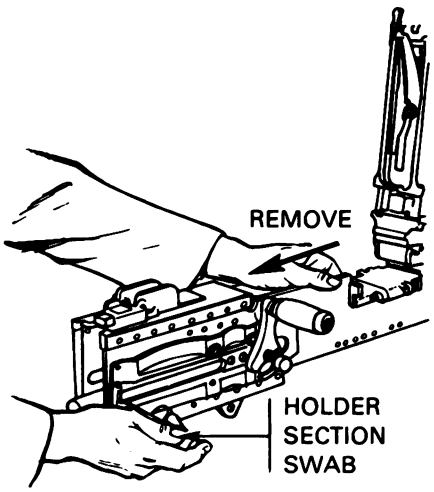
PERFORMANCE MEASURES (cont)

f. Barrel buffer group and barrel extension group (fig 4). To remove the barrel buffer group and barrel extension group, insert a pointed instrument through the hole in the lower left corner of the right sideplate. Push in on the barrel buffer body spring lock. At the same time, place one hand inside the receiver and push the barrel extension group and buffer group to the rear. Remove the barrel group to the rear. Remove the barrel buffer group and barrel extension group from the receiver. Separate the two groups by pushing forward on the accelerator tips.

g. Barrel buffer assembly (fig 5). Pull the barrel buffer assembly from the rear of the buffer body group. The buffer assembly will not be disassembled. This completes general disassembly for limited cleaning and replacement of groups.



REMOVE BARREL BUFFER AND BARREL EXTENSION GROUPS.

Figure 4.

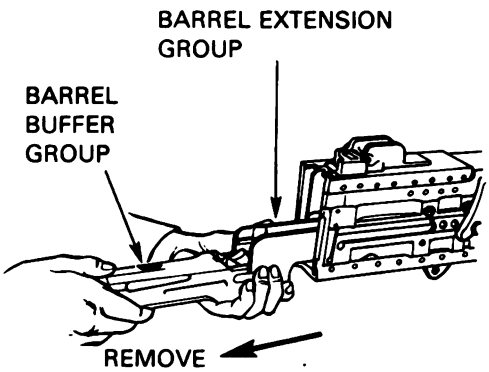


Figure 5.

2. Maintenance and inspection. Care, cleaning, and maintenance determine whether or not the gun will function properly when needed. The bore and chamber must be properly maintained to preserve accuracy. Because of the close fit of working surfaces and the high speed at which the gun operates, the receiver and

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PERFORMANCE MEASURES (cont)

moving parts must be kept clean, correctly lubricated, and free from burrs, rust, dirt, and grease to be sure of proper, efficient functioning.

a. Mount maintenance. The care, cleaning, lubrication, and adjustment of the mount used with the gun are no less important. The functioning of the gun and mount together determine overall effectiveness. All accessories and equipment used with the gun and mount, including ammunition, must be properly maintained.

b. Maintenance system. To be sure of proper care of the machinegun, it is necessary to have a system of maintenance or a standing operating procedure (SOP) for the frequency of cleaning. Each gun should be cleaned as soon after firing as possible and each time it is exposed to field conditions. Under combat conditions, the gun should be cleaned and oiled daily. Under extreme climatic and combat conditions, it may be necessary to clean and lubricate more frequently. Under ideal conditions, where the gun is not used and is stored in a clean, dry place, it may be necessary to inspect, clean, and lubricate every 5 days. The gun should be disassembled, cleaned, and oiled in a clean, dry location, where it is least exposed to moisture, dirt, etc. Maintenance and preparation for storage over a longer period of time is covered in ordnance regulations (Ord 3SNL A-1). If possible, keep the gun covered with a gun cover, canvas, tarpaulin, or poncho when not in use.

3. Cleaning materials.

a. Rifle bore cleaner is used to clean the bore of the machinegun barrel after firing. Immediately after using bore cleaner, dry the bore and any parts of the gun exposed to the bore cleaner; then apply a thin coat of special preservative lubricating oil.

b. When bore cleaner is not available, hot or cold water can be used; however, warm or hot, soapy water is recommended. After using soap and water, dry the barrel and apply a thin coat of special preservative lubricating oil.

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PERFORMANCE MEASURES (cont)

4. Lubricating.

   a. Special preservative lubricating oil (PL) is a thin oil used for lubricating at normal and low temperatures and for providing temporary protection against rust. The entire gun can be lubricated with this oil.

   b. Lubricating oil (LSA) should be used to lubricate all friction-producing parts of the gun as well as exterior parts exposed to the elements. LSA will not burn off during firing or wash off during rain.

   c. In cold climates (consistently below $0^{\circ}F$), lubricate the gun with lubricating oil, arctic weather (LAW) and keep it covered as much as possible. For further information, see TM 9-207 and FM 31-70.

   d. In hot, humid climates, inspect the gun frequently for signs of rust. Keep the gun free of moisture and lightly oiled with lubricating oil (LSA).

5. Care and cleaning before, during, and after firing.

   a. Before firing (when the situation permits), take the following steps to be sure of efficient functioning of the machinegun.

      (1) Disassemble the gun into its major groups or assemblies.

      (2) Clean the bore and chamber, but do not oil them.

      (3) Clean all metals parts thoroughly and apply a light coat of oil to all metal parts which do not come in contact with the ammunition.

   b. To be sure of complete removal of powder residue and primer fouling from the bore of the machinegun barrel, the bore should be cleaned once each day, for at least three consecutive days after firing. The bore sweats out this fouling or residue, and cleaning must be repeated until there is no further evidence of sweating.

6. Care and cleaning under unusual climatic conditions. Extreme cold, hot, dry, and tropical climates affect the gun and its functioning. Care should be taken under these climatic conditions

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PERFORMANCE MEASURES (cont)

to be sure the gun is cleaned daily with the prescribed lubricants and protected from the elements by some sort of cover if possible. Further information on care and cleaning of the gun under unusual climatic conditions can be found in TM 9-1005-213-10.

7. Assembly. To assemble the machinegun, replace the groups and assemblies in reverse order of disassembly.

REFERENCES

FM 23-65, Browning Machinegun, Caliber .50 HB, M2, chap 2, p 4.
FM 31-70, Basic Cold Weather Manual, C1, chap 6, p 123.
TM 9-1005-213-10, Operator's Manual: Machinegun, Caliber .50 Browning, M2, C2, chap 3, pp 48 and 58.
TEC 941-071-0116-F, Caliber .50 Machinegun, Mechanical Training.

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SET HEAD SPACE AND TIMING ON A CALIBER .50 HB M2 MACHINEGUN

CONDITIONS

Given an assembled caliber .50 machinegun (track or tripod mounted) with incorrect head space and timing, and a head space and timing gage.

STANDARDS

Within 10 minutes, the following conditions must be obtained once the gun is cocked and the bolt is forward:

1. Head space. With the retracting slide handle pulled back 1/16-inch (so that the barrel extension is not resting against the trunnion block), the GO end of the head space gage will enter the T-slot and the NO GO end will not (fig 1).

2. Timing. With the NO FIRE timing gage inserted between the barrel extension and trunnion block (with the beveled edge of the gage on the barrel notches), the firing pin will not release when the trigger is depressed. When the NO FIRE timing gage is replaced by the FIRE gage, the firing pin will release when the trigger is depressed (fig 2).

PERFORMANCE MEASURES

1. Head space adjustment with the gage (fig 1).

   a. Raise the cover. Retract the recoiling parts and screw the barrel all the way into the barrel extension, then loosen the barrel a measure of two notches or clicks.

   b. Pull the retracting slide handle to its rearmost position. Hold the handle to the rear and press the bolt latch release, allowing the bolt to go forward slowly to prevent damage of parts.

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PERFORMANCE MEASURES (cont)

Notes. 1. Be careful not to depress the trigger, since this will cause the firing pin to be released.

2. The firing pin should never be released with the gage in the T-slot as this could damage the firing pin and gage.

c. Pull the retracting slide handle back until the barrel extension is 1/16-inch from the trunnion block.

d. Insert the GO end and the NO GO end of the head space gage in the T-slot. If the GO end of the gage enters freely down to the center ring on the gage and the NO GO end does not enter, head space is correct.

e. If the GO end of the gage does not enter freely, the barrel must be unscrewed one notch (or click) at a time (check with the gage after each notch), until the GO end of the gage enters freely. To complete the adjustment, try to insert the NO GO end of the gage. If it does not enter, head space is correct.

f. If the NO GO end of the gage enters the T-slot, head space is too loose. The barrel must be screwed into the barrel extension (one click at a time), checking with the gage after each click, until the GO end enters and the NO GO end does not.

2. To set the timing:

a. After head space has been set, make sure the gun is cocked and all moving parts are fully forward. Then pull back on the retracting slide handle with the right hand palm up, making a large enough separation between the trunnion block and the barrel extension to insert the "FIRE" gage. Place the beveled edge of the gage against the barrel notches, then allow the bolt to go forward by releasing the retracting slide handle.

b. The next step is to remove the backplate. To remove the backplate, you must pull out on the backplate latch lock and up on the backplate latch and spade grips.

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PERFORMANCE MEASURES (cont)

c. Inside the back of the receiver you will see the trigger lever and timing adjustment nut. Screw the timing adjustment nut down, to the left, until it rests lightly on the trigger lever. Apply strong pressure upward on the trigger lever with your thumb; the gun should not fire.

d. To set timing, turn the timing adjustment nut up, or to the right, one click at a time. After each click apply strong pressure upward on the trigger lever, attempting to release the firing pin.

e. When you hear the gun fire, turn the timing adjustment nut up two additional clicks. The reason for the additional clicks is that there are six clicks of timing between early and late timing. The gun has already fired on the first click, two more will give you a total of three clicks and the approximate center of the proper timing adjustment.

f. Replace the backplate, remove the "FIRE" gage and recock the gun. Then push the bolt latch release and ease the bolt forward.

3. To check the timing:

a. Move to the side of the gun and push back on the retracting slide handle and insert the "NO FIRE" gage in the same place the "FIRE" gage was, between the barrel extension and the trunnion block. The beveled edge of the gage should be against the barrel notches.

b. Depress the trigger; the gun should not fire. If the firing pin is released, the timing is too early. If early timing exists, the gun will fire two rounds and stop firing because the extractor does not come far enough forward to extract another round.

c. To correct early timing, remove the backplate and turn the timing adjustment nut all the way down until it rests lightly on the trigger level and begin again. If the firing pin does not release when the "NO FIRE" gage is inserted, remove it and reinsert the "FIRE" gage. If the firing pin is released when the trigger is depressed, proper timing has been set.

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PERFORMANCE MEASURES 071-313-3455 (cont)

REFERENCES

FM 23-65, Browning Machinegun Caliber .50 HB, M2, chap 3, sec I, p 77.
TM 9-1005-213-10, Operator's Manual: Machinegun, Caliber .50 Browning, M2, p 18, para 2-4.
TEC 941-071-0117-F, Caliber .50 Machinegun, Head Space and Timing.

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MOUNT AND DISMOUNT A CAL .50 HB M2 MACHINEGUN ON AN M113A1

CONDITIONS

Given an M113A1 with the machinegun mount installed, BII, and a requirement to install the machinegun in the mount.

STANDARDS

1. Within 5 minutes, install the machinegun in the mount.
2. Within 3 minutes, dismount the machinegun.

PERFORMANCE MEASURES

1. To mount the machinegun in the mount:
   a. Remove the cradle pins from the mount.
   b. Line up the front and rear holes in the machinegun with the holes in the cradle and install the cradle pins.
2. To dismount the machinegun:
   a. Remove both cradle pins and lift out the machinegun.
   b. Re-insert the cradle pins.
3. To secure the machinegun for travel:
   a. Install the travel lock pin in the pintle.
   b. Install the traverse travel lock pin in the mount.
   c. Move the travel lock arm into position and tighten the positioning pin.

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored M113A1, chap 2, sec III, pp 2-61 and 2-62.

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ENGAGE TARGETS WITH A CALIBER .50 HB M2 FLEX MACHINEGUN

CONDITIONS

Given a caliber .50 HB M2 flex machinegun mounted on an M113A1 or M551, ammunition, and targets.

STANDARDS

1. Within 1 minute, load the cal .50 HB M2 machinegun.
2. Within 10 seconds in daylight and 15 seconds at night, engage targets so that the rounds hit the target area.

PERFORMANCE MEASURES

1. Load the weapon.
   a. Make sure the bolt is forward and the cover is closed.
   b. Insert the double loop end of the ammunition belt (open side down) into the feedway, until the first round is engaged by the belt-holding paul.
   c. Grasp the retaining slide handle and vigorously jerk the bolt to the rear. Then release the retaining handle.
   d. Press the bolt latch release, allowing the bolt to go forward.
   e. Using the procedures above, pull and release the bolt a second time. The weapon is now loaded.
2. Engage targets, using proper techniques of fire. Prior to engaging targets with a vehicle-mounted caliber .50 machinegun, make sure the traverse travel lock pin is removed.
3. Announce "CALIBER .50" upon identifying the target.
   a. Stationary or point targets. For greater accuracy when engaging point targets with the caliber .50, the vehicle should be at the halt.

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PERFORMANCE MEASURES (cont)

(1) Fire at the near edge of the target.

(2) Manipulate the gun to bring the burst on target. Fire 10- to 20-round bursts.

b. Area targets.

(1) Identify the targets.

(2) Fire rounds and attempt to sense and adjust.

(3) Lay the gun on the center of mass and traverse, searching to either flank.

c. Moving targets.

(1) Identify the target.

(2) Apply the proper lead.

(3) Fire rounds and attempt to sense and adjust.

d. Aerial targets.

(1) Estimate the speed of the aircraft.

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PERFORMANCE MEASURES (cont)

(2) To engage high-performance aircraft, aim to the front with a 100-yard lead, and fire continuous bursts (fig 1).

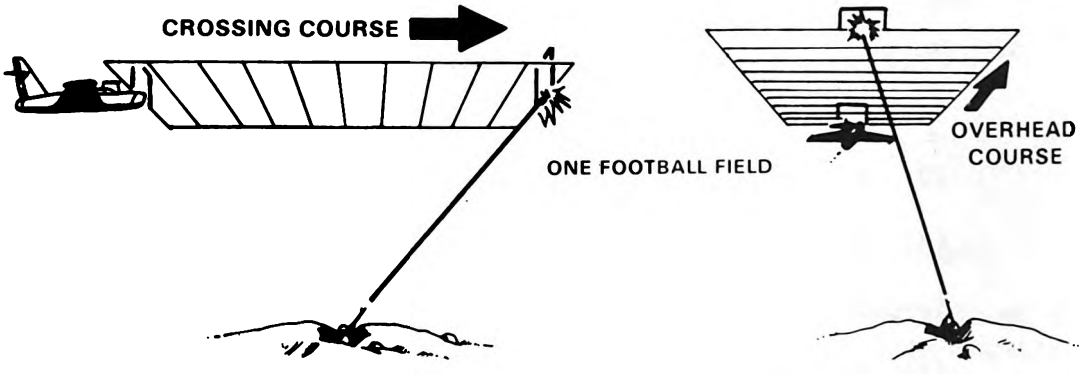

Figure 1. Firing at fast aircraft with M16, M60, and cal .50.

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PERFORMANCE MEASURES (cont)

e. From a moving vehicle.

(1) Fire in bursts of 10 to 20 rounds.

(2) Engage the nearest target, and let the movement of the vehicle move the burst through the target.

f. Announce "TC COMPLETE" upon completion of engagement.

g. At night and during limited visibility.

(1) Use the M3 mount during daylight hours to align the weapon on target. Record data and, if appropriate, maintain orientation on target.

(2) Prepare a range card.

3. When a stoppage occurs, apply immediate action.

a. If the gun fails to fire, wait 5 seconds.

b. Pull the bolt to the rear, and check for proper ejection and feeding. Then release the bolt, re-lay on the target, and attempt to fire.

c. If the gun fails to fire again, wait 5 seconds, pull the bolt to the rear, and engage the bolt latch. Open the cover, remove the ammunition, hand-function through one cycle, reload, and attempt to fire. If the weapon still fails to fire, inspect the gun to determine the cause of stoppage.

CAUTION: When more than 150 rounds have been fired in a two-minute period, the barrel will be hot. If the chambered round cannot be removed within 10 seconds, keep the weapon on target. Wait 5 minutes before attempting to remove the round, to prevent a cook-off with the chamber open.

4. Continue firing until ammunition is expended.

5. Clear the weapon.

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TASK SUMMARY 171-139-1036 (cont)

REFERENCES

FM 17-12-5, Tank Gunnery for M551, p 26.
FM 23-65, Browning, Machinegun, Caliber .50 HB M2, chap 5, sec II.

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MAINTAIN A .45 CALIBER PISTOL

CONDITIONS

Given one .45 cal pistol; one magazine; CR solvent cleaning compound; volatile mineral spirits, paint thinner or dry cleaning compound solvent; clean cotton rags; and lubricating oil PL special.

STANDARDS

1. Within 1 minute, clear and disassemble the pistol.
2. When cleaned, the pistol must be free of all rust, dirt, grime, grit, and corrosion.
3. When lubricated, all surfaces must be coated with a thin coat of oil.
4. Within 1 minute after the pistol is cleaned and lubricated, it must be reassembled and a functions check must be completed.

PERFORMANCE MEASURES

1. Clear the .45 cal pistol (see Task Summary 171-376-1002, Engage Targets with a .45 Cal Pistol).
2. Disassemble the .45 cal pistol (fig 1).
3. Clean and maintain the .45 cal pistol.
   a. Clean the bore and the face of the slide after firing with CR solvent cleaning compound.

   Note. CR solvent cleaning compound is usable at temperatures of -20°F and higher.

   b. If CR is not available, clean the bore with hot, soapy water. After using the solution, dry the barrel thoroughly and apply a light coat of oil.

   c. Remove oil, grease, or light rust preventive compounds from weapons by using volatile mineral spirits, paint thinner, or dry cleaning solvent. Apply these cleaning agents with a rag to large parts and use them as a bath for small parts.

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PERFORMANCE MEASURES (cont)

4. Lubricate the .45 caliber pistol.

   a. Lubricate with PL special (general purpose) by applying a thin coat of oil to all metal surfaces.
   b. Lubricate with engine oil SAE 10 if lubricating and preservation oil cannot be obtained. When engine oil is used, the weapon must be inspected, cleaned, and oiled frequently.

5. Assemble the .45 caliber pistol (fig 2)

6. Conduct a functions check.

   a. Depress the safety lock.
   b. Pull the slide fully to the rear.
   c. Release the slide by pushing down on the slide stop (the hammer should remain cocked).
   d. Holding the weapon with a normal grip, depress the grip safety and pull the trigger. The hammer should fall.

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PERFORMANCE MEASURES (cont)

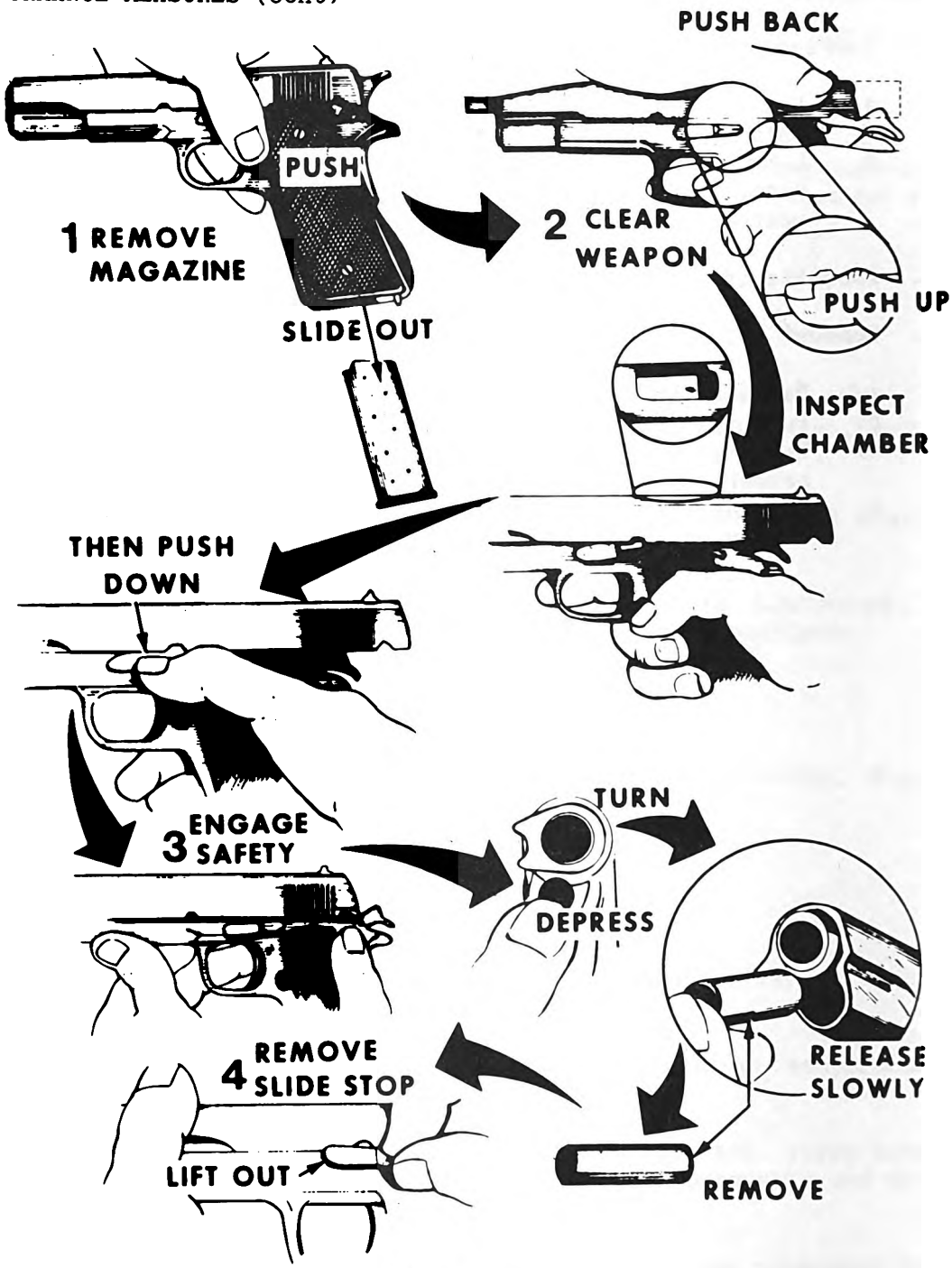

Figure 1.

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PERFORMANCE MEASURES (cont)

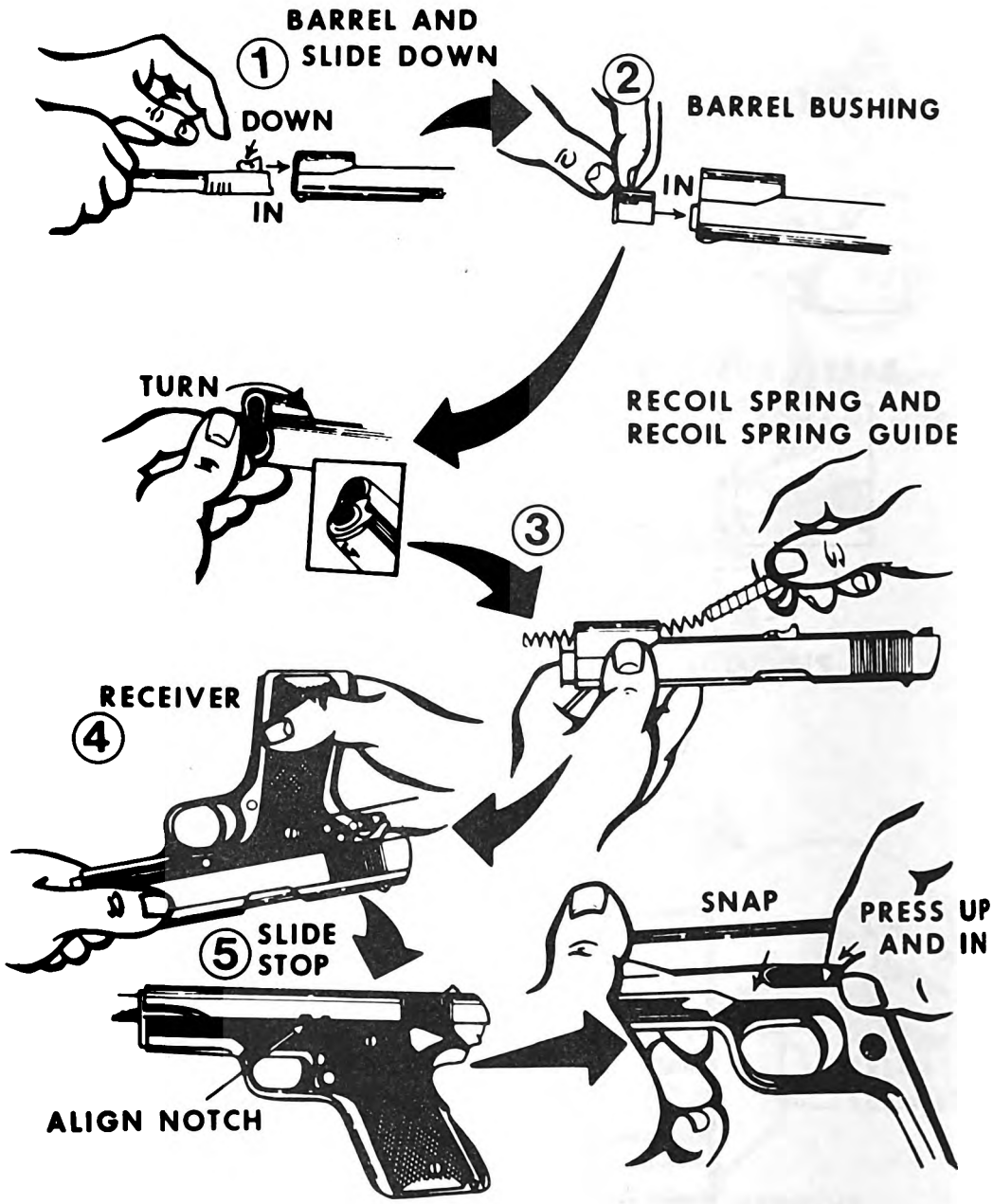

Figure 2.

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ENGAGE TARGETS WITH A .45 CALIBER PISTOL

CONDITIONS

Given a loaded .45 caliber pistol, ammunition, and targets.

STANDARDS

1. Upon acquiring a target, engage it immediately.
2. Within 5 seconds, apply immediate action to reduce any stoppage that might occur.

PERFORMANCE MEASURES

1. Apply the fundamentals of quick fire.
   a. Grip. For quick fire without the use of sights, the pistol must act as an extension of your arm. To grip the pistol:
      (1) Hold the pistol in your nonfiring hand (fig 1) and form a "V" with the thumb and forefinger of your shooting hand.
      (2) Place the pistol in the "V" with the sights in line with your firing arm.
      (3) Wrap you lower three fingers around the grip, putting equal pressure with all three fingers straight to the rear.

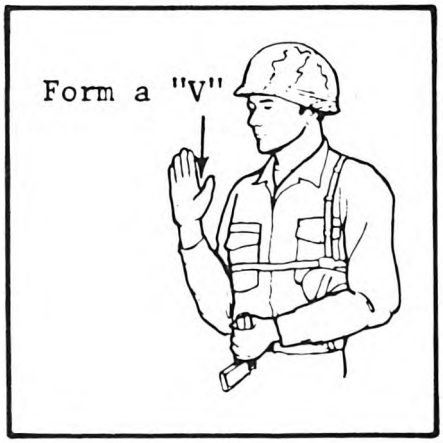

Figure 1.

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PERFORMANCE MEASURES (cont)

b. Stance. From a ready position with your feet a comfortable distance apart (fig 3), bend your knees slightly and thrust your shooting arm forward (fig 4).

Figure 3.

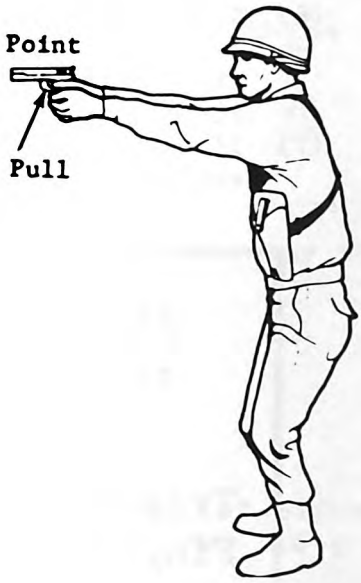

Figure 4.

2. Chamber a round in the pistol (fig 5).

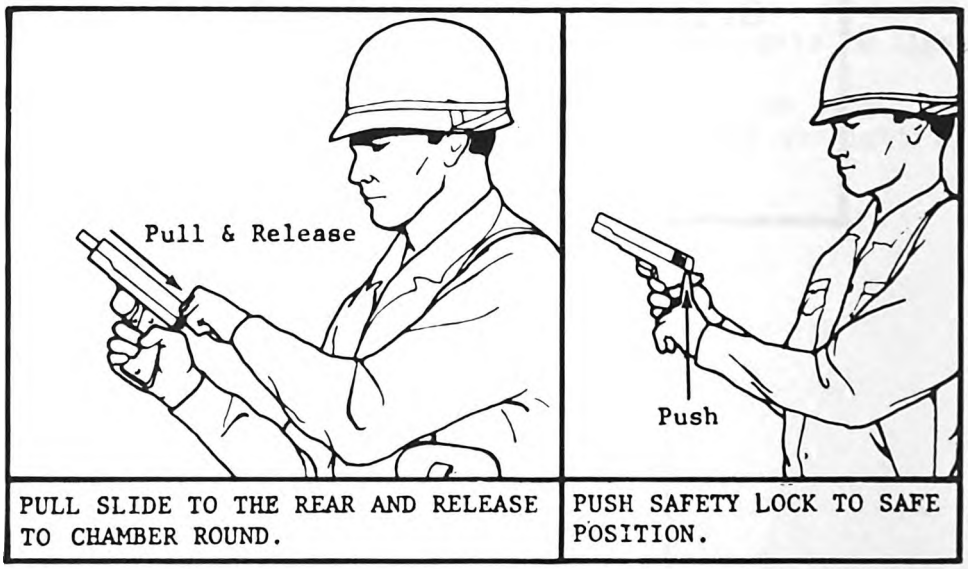

Figure 5.

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PREPARE AN ANTIARMOR RANGE CARD (TOW, DRAGON, 106-MM OR 90-MM RECOILLESS RIFLE)

CONDITIONS

During daylight, in a field environment, with field clothing and combat equipment with a weapon, given a TOW, Dragon, or 106-mm/90-mm recoilless rifle, a designated firing position, a sector of fire, target reference data, paper, pencil, and a compass.

STANDARDS

Within the time designated, prepare a range card that illustrates a representative sketch of the terrain and includes:

1. The firing position indicated by the appropriate weapon symbol.
2. The location of the firing position indicated by its distance and azimuth from a known point.
3. A sector of fire indicated by an enclosed, solid line which shows complete boundaries, maximum engagement line, and:
   a. Ranges and azimuths to anticipated target engagement locations and target reference points within the sector of fire.
   b. Deadspace within the sector of fire.
4. Magnetic north arrow (properly oriented).
5. Marginal data:
   a. Unit designation (no higher than company).
   b. Time and date of preparation.
   c. Firing position designation (primary, alternate, or supplementary.

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PERFORMANCE MEASURES

1. A range card is a sketch of the terrain that a weapon has been assigned to cover by fire. It contains information which assists in the planning and control of fires, in the rapid detection and engagement of targets, and in the orientation of replacement personnel or units. By using a range card, a gunner can quickly and accurately determine the information he needs to engage targets.

2. Sector of fire.

   a. A sector of fire is a portion of the battlefield within which you are responsible to engage targets with your weapon. Leaders assign sectors of fire to be sure that no matter where an enemy target approaches, there will be a weapon positioned which can engage it. After he shows you where to position your weapon, your leader will indicate your sector of fire by pointing out the portion of the terrain for which you are responsible. He will do this by giving you boundaries located between prominent terrain features or by left and right limits indicated by terrain features or azimuths (fig 1). If necessary, he may also assign you more than one sector of fire and will designate one as primary and others as secondary.

   b. Your leader may also designate anticipated target engagement locations within your sector of fire. These are recognizable terrain features on or near likely enemy avenues of approach (fig 1). This information is placed on your range card.

   c. Starting at the company level, commanders may pick out natural or man-made terrain features on the battlefield which can be used as reference points for locating targets and adjusting direct fires. These are called target reference points (TRP), and are assigned a specific letter and number. If there are TRPs in or near your sector of fire, your leader may point them out and tell you the letter and number (fig 1). If he does, they are shown on your range card.

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PERFORMANCE MEASURES (cont)

d. There may be natural or man-made terrain features such as hills, draws, or buildings within your sector(s) of fire which prevent you from hitting a target. The area blocked by these features is called deadspace. All deadspace in your sector(s) of fire must be determined because your leaders need to plan other types of fire (mortars, artillery, mines, etc.) to cover the area. Deadspace is indicated on your range card.

e. The length of your sector of fire is normally limited by the maximum engagement range of your antiarmor weapon, but it can be less if there are any natural or man-made terrain features which prevent you from engaging targets at maximum engagement range (trees, fences, etc.). Regardless of what affects it, the maximum engagement range is shown on your card as a maximum engagement line.

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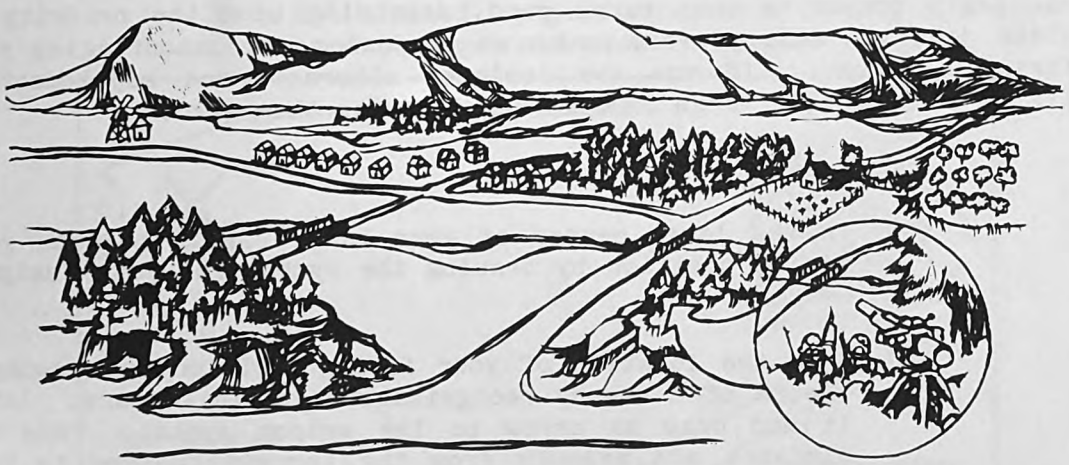
PERFORMANCE MEASURES (cont)



EXAMPLE:

SECTION LEADER TO SQUAD LEADER:

"I want you to cover a sector of fire which begins here at your firing position and goes to a point about ____ meters beyond that windmill on the left; moves to the right across the high ground at ____ meters behind the houses, through that woodline, behind the hill, church, and orchard until it reaches a point about ____ meters beyond the right leading edge of that orchard, and returns here to your firing position. The enemy will be approaching from the north so they will be using those two roads to enter our sector. Plan on engaging enemy armor as soon as it comes within range on the road behind the church and orchard. Engage enemy targets as soon as they appear on the second road as they approach from behind the left side of that large hill. There are two target reference points within your sector, so copy them down: the windmill is TRP Charlie Charlie 101 and the church is TRP Charlie Charlie 102."

Figure 1.

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PERFORMANCE MEASURES (cont)

3. Preparation of the range card.

a. Once your leader has given you the necessary information, you can begin preparing your range card, depending upon the priority of other jobs you must perform, such as preparing and camouflaging your firing position. If you are assigned alternate and supplementary firing positions, a range card is required for them also.

b. Procedures:

(1) In the lower center of your range card, indicate your firing position by drawing the symbol for your assigned weapon.

(2) Show the location of your firing position by drawing a sketch of a nearby recognizable terrain feature. Label it and draw an arrow to the weapon symbol. Add the distance and azimuth from the terrain feature to your firing position (fig 2).

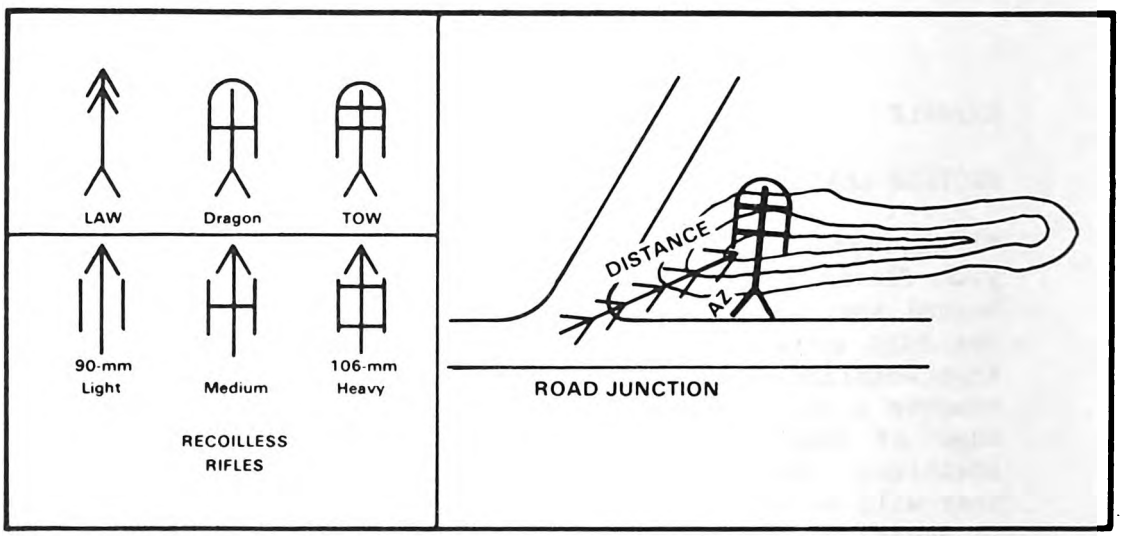

Figure 2.

(3) Draw and label sketches of terrain features which indicate the boundaries of your sector of fire. Draw lines from your weapon symbol to the terrain features (fig 3).

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PERFORMANCE MEASURES (cont)

(5) Orient the range card with the terrain and determine the direction of magnetic north with a compass. Draw a magnetic north arrow using the straight edge of the compass (fig 9).

(6) In a corner of your range card, place the following marginal data which is used by leaders to identify range cards:

(a) Unit description. Never indicate your unit higher than your company. If your range card gets lost, the enemy will not be able to learn important military information if they find your range card (fig 9).

(b) Time and date of preparation (fig 9).

(c) Type position (primary, alternate, supplementary) (fig 9).

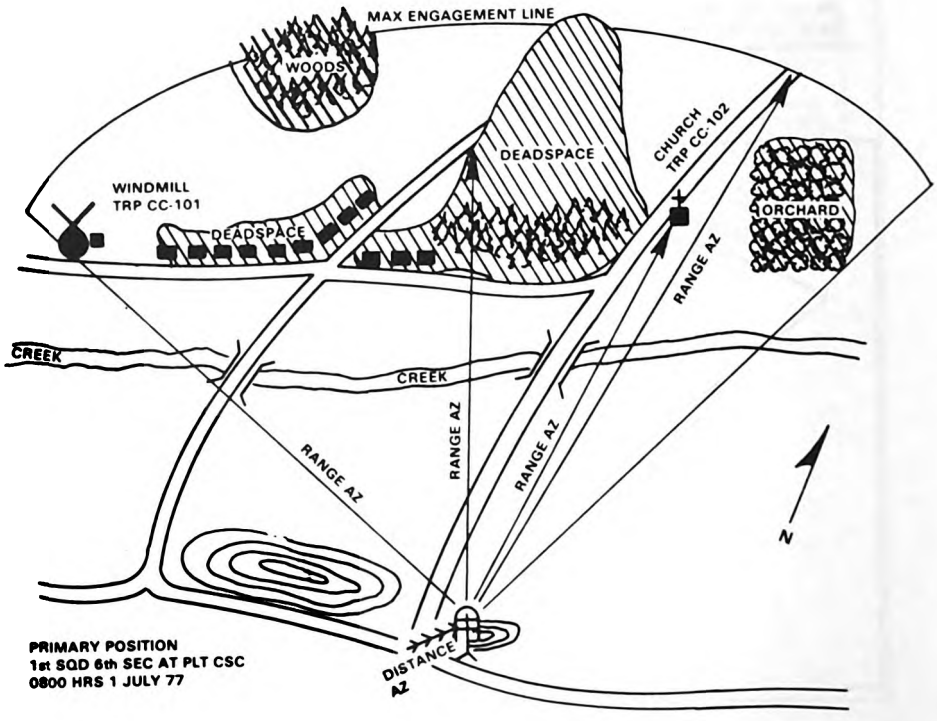

Figure 9.

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PERFORMANCE MEASURES (cont)

(7) Make two copies of each range card. Keep one copy at your firing position. The second copy will normally be picked up by your squad or section leader for preparation of fire plans and final coordination of fires.

REFERENCES

None.

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CONDUCT A PREOPERATIONAL INSPECTION OF THE DRAGON TRACKER AND ROUND

CONDITIONS

Given a DRAGON tracker and a round of ammunition (inert round for training only), lens tissue, a wood dowel, and ethyl alcohol.

STANDARDS

Within 5 minutes, complete a preoperational inspection of the DRAGON tracker and a round of ammunition in accordance with the performance measures below.

PERFORMANCE MEASURES

1. Preoperational inspection of a round of ammunition (fig 1).

   a. Check the exterior surface for oil, dirt, or grease.

   b. Check the forward shock absorber for loose cushions, cracks, or other visible damage.

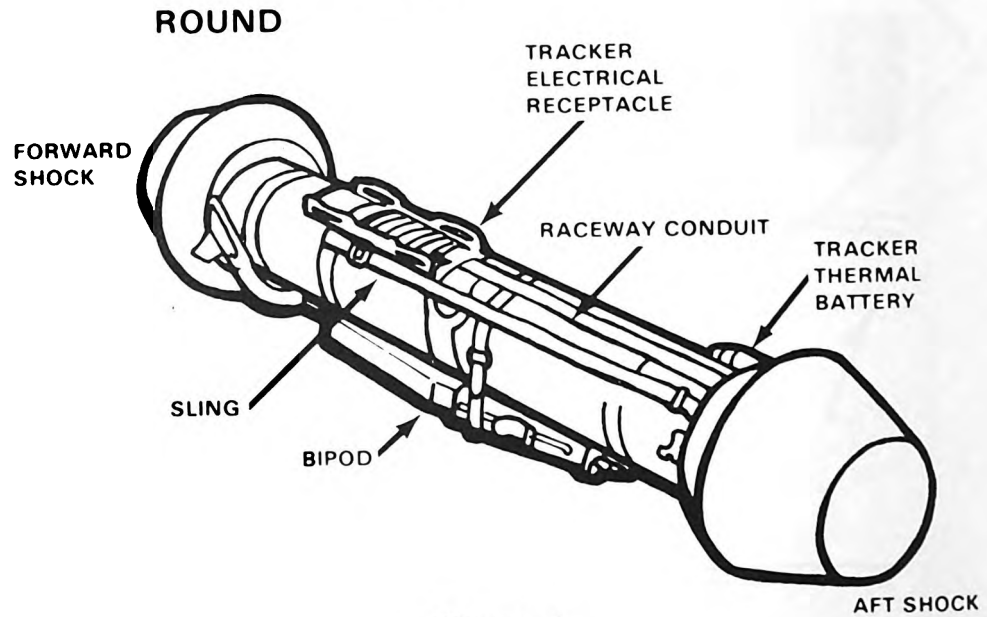

Figure 1.

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PERFORMANCE MEASURES (cont)

c. Inspect the tracker support assembly for damage and firm fit of the cover on the electrical connector. Remove the cover and inspect the electrical connection for damage.

d. Inspect the raceway conduit for damaged wires.

e. Check the electrical cable nipple for damage (the cable nipple is the connection from the raceway conduit to the thermal battery).

f. Inspect the thermal battery for damage.

g. Inspect the aft shock absorber for loose cushions, cracks, or other visible damage.

h. Inspect the carrying sling for rips, tears, or other damage.

i. Inspect the launcher tube for gouges, cracks, punctures, and other visible damage.

j. Check the bipod for damage and make sure the retaining strap is secured.

CAUTION: Do not lower or extend the bipod to perform this inspection.

k. Inspect the round for legible markings, i.e., lot number and nomenclatures.

l. Check the humidity indicator card (fig 2) through the viewport in the face of the forward shock absorber. The indicator's circles should be blue.

Note. If not blue, turn in if the situation permits.

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PERFORMANCE MEASURES (cont)

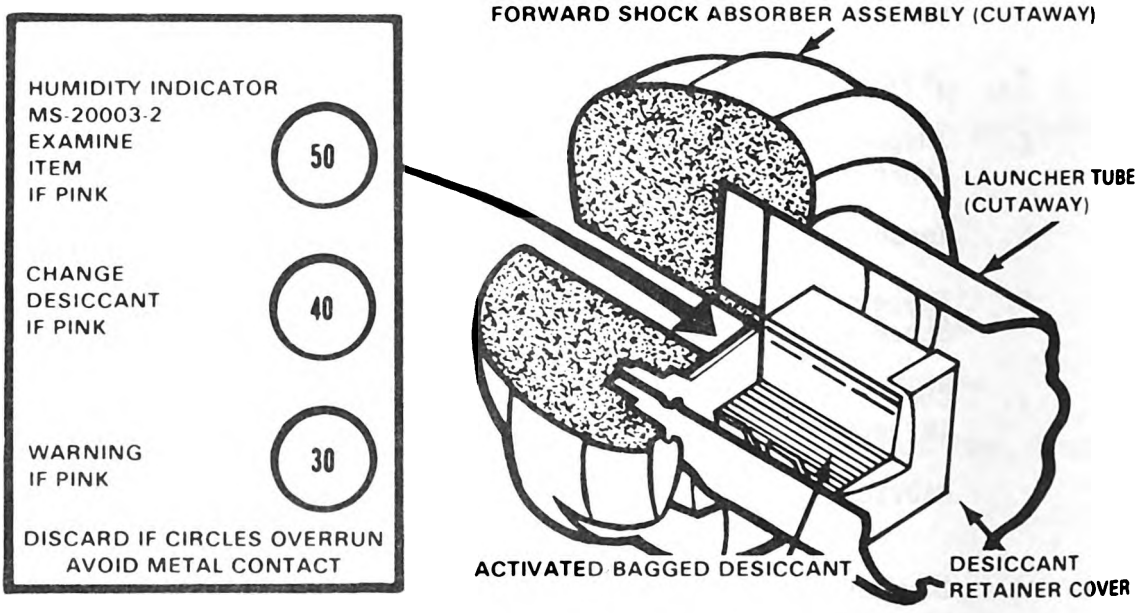

Figure 2.

2. Preoperational inspection of the track (fig 3).

   a. Check the external surfaces for oil, dirt, or grease.

   b. Inspect the shock absorbers to be sure they are present, tight, and not damaged.

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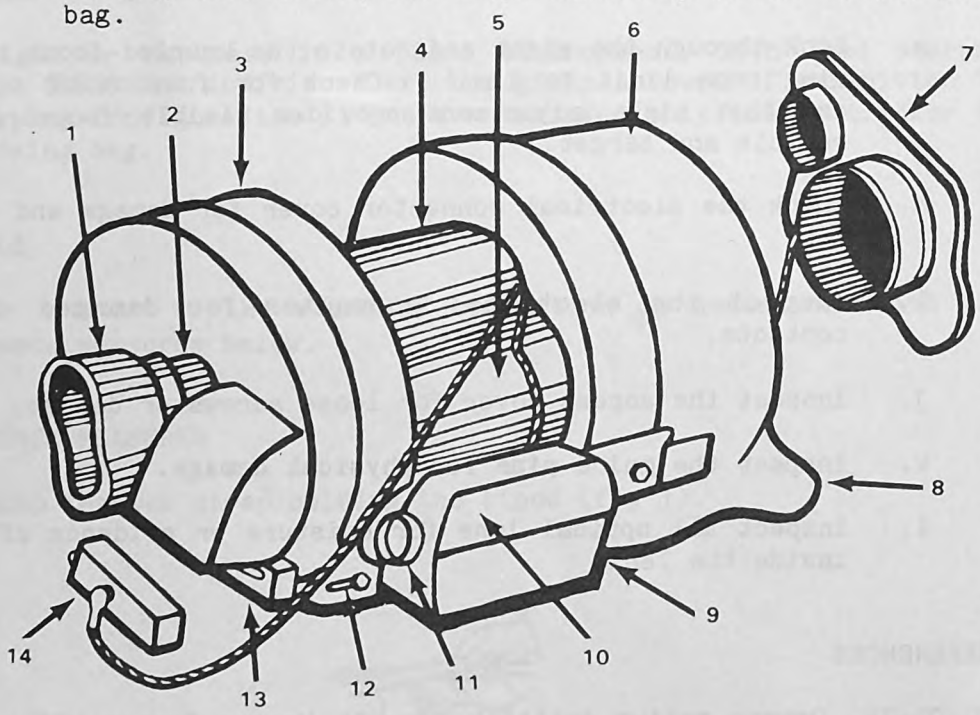
PERFORMANCE MEASURES (cont)

c. Remove the lens cover and inspect all lenses for dirt, cracks, or chips. If the lenses are dirty, clean with the tissue, wood dowel, and ethyl alcohol provided in the tracker bag.



1. EYEGUARD
2. SIGHT ADJUSTMENT
3. AFT SHOCK ABSORBER
4. OPTICAL SIGHT ASSEMBLY
5. INFRARED RECEIVER ASSEMBLY
6. FORWARD SHOCK ABSORBER
7. LENS COVER
8. LANYARD
9. FIRING MECHANISM
10. TRIGGER LEVER BOOT
11. TRIGGER SAFETY PLUNGER BOOT
12. GUIDE PIN BREACH
13. ELECTRICAL CONNECTOR
14. ELECTRICAL CONNECTOR COVER W/LANYARD

Figure 3.

WARNING: Do not perform a preoperational inspection of the tracker with it mated to the round.

d. Check to be sure the trigger lever will not operate unless the safety is depressed. Depress the safety and check for freedom of operation. A slight metallic click should be heard when the safety is depressed.

e. Depress the safety and check the trigger lever for freedom of operation. A metallic click should be heard when the trigger is depressed.

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PERFORMANCE MEASURES (cont)

f. Inspect the eyeguard for cracks, other visible damage, and a secure fit which allows rotation (fig 3). The eyeguard should rotate independently of the focus ring.

g. Look through the sight and rotate the knurled focus adjusting ring from limit to limit. Check for freedom of operation, and that sight adjustment provides visible focusing of the reticle and target.

h. Check the electrical connector cover for damage and a secure fit.

i. Inspect the electrical connector for damaged or dirty contacts.

j. Inspect the access cover for loose screws or damage.

k. Inspect the guide pins for physical damage.

l. Inspect all optical lens for moisture or evidence of fogging inside the lens.

REFERENCES

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, chap 5, pp 43 thru 50, para 5-3 thru 5-6.

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PERFORMANCE MEASURES (cont)

3. Check that the forward bipod brace is engaged (fig 3).

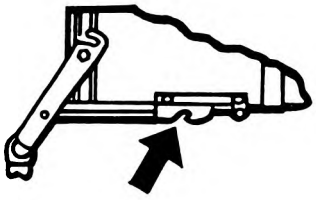

Figure 3.

4. Depress the bipod friction lock and extend the legs (fig 4).

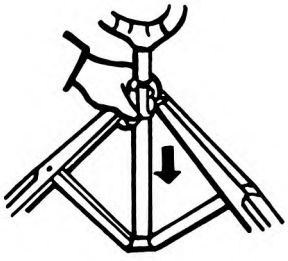

Figure 4.

5. Remove the electrical connector cover from the round (fig 5).

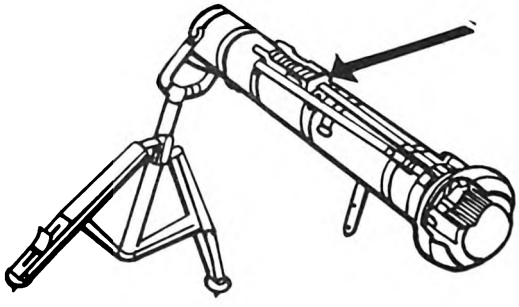

Figure 5.

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DETERMINE IF A TARGET IS ENGAGEABLE (DRAGON)

CONDITIONS

Acting as a Dragon gunner, during daylight or darkness with artificial illumination, with an operational Dragon weapon system, given targets moving into your sector of responsibility.

STANDARDS

Within 5 seconds, determine if there are targets within range that can be engaged.

PERFORMANCE MEASURES

1. To acquire a target:

   a. Focus the sight using the sight adjustment (fig 1, item 2).

   b. Hold the sight adjustment stationary while rotating the eyeguard to fit the eye (fig 1, item 1).

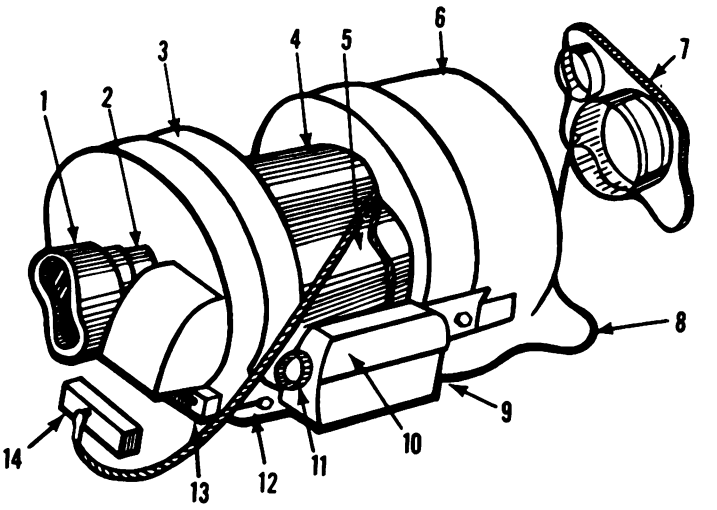

Figure 1.

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PERFORMANCE MEASURES (cont)

c. When the target has been acquired, evaluate the target to determine if it is within range.

(1) Flanking targets (full-stadia).

(a) Adjust the sight picture (by moving the launcher) to center the target between the stadia lines (fig 2).

(b) If the target falls between the stadia lines, it is not within range (fig 3).

(c) If the target meets or exceeds the stadia lines, it is within range (fig 4).

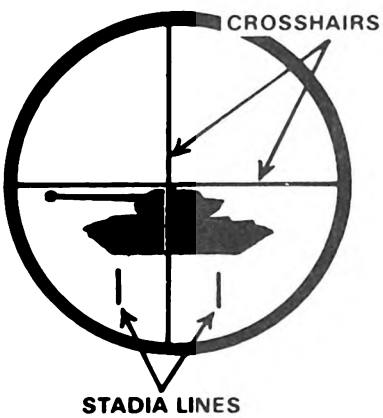

Figure 2.

Figure 3.

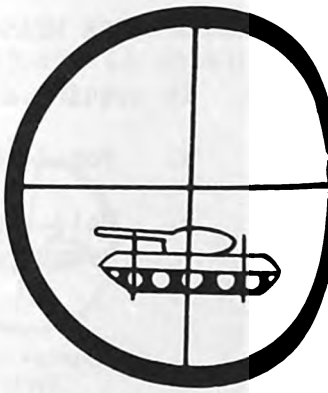

Figure 4.

(2) Targets moving toward or away from you (half-stadia).

(a) Adjust the sight picture to center the target between the vertical crosshair and one of the stadia lines.

(b) If the target falls between the vertical crosshairs and stadia lines, the target is not in range (fig 5).

(c) If the target meets or exceeds the vertical crosshairs and one of the stadia lines, it is in range (fig 6).

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PERFORMANCE MEASURES (cont)

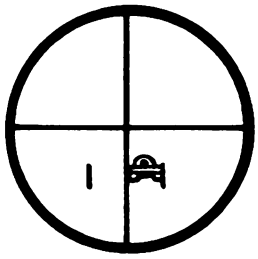

Figure 5.

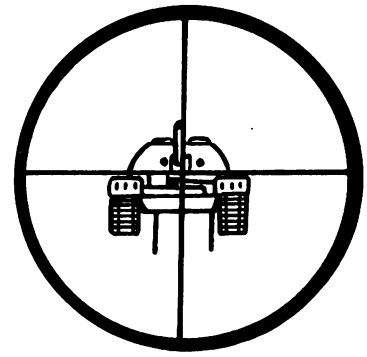

Figure 6.

(3) Oblique targets.

(a) If you can see more of the side than the front, use the full-stadia method.

(b) If you can see more of the front than the side, use the half-stadia method.

2. To determine if the target is engageable:

a. Place the edge of the sight on the target and inspect the anticipated path of the vehicle to the opposite edge of the sight.

b. If there is a covered area along this path (fig 7), there is not enough time to fire and hit the target. The target is NOT engageable.

c. If there are no covered areas (fig 8), there is enough time to fire and hit the target. The target IS engageable.

d. Use the full sight method to determine kill areas in your sector of fire. This information may be placed on your antiamor range card.

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PERFORMANCE MEASURES (cont)

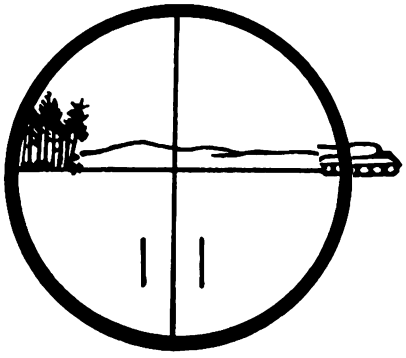

Figure 7.

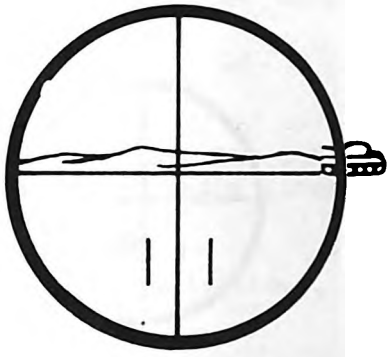

Figure 8.

REFERENCES

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, chap 4, p 38, para 4-2f.

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DEMONSTRATE CORRECT DRAGON FIRING POSITIONS

CONDITIONS

During daylight or darkness in a field environment, with load bearing equipment (LBE) and individual weapon; given a round of ammunition (inert) and a tracker attached to the round. The DRAGON is prepared for firing in accordance with Task Summary 071-317-3302, Prepare the DRAGON for Firing.

STANDARDS

Assume either the kneeling or standing supported firing position and be prepared to engage a target:

1. Within 15 seconds for designated gunners.
2. Within 30 seconds for non-designated gunners.

PERFORMANCE MEASURES

1. The DRAGON should be fired from the kneeling or standing supported position. The sitting and prone positions can be used but are not recommended.

   Note. Regardless of the firing position used, always make sure the backblast area is clear.

   a. Kneeling position (fig 1).

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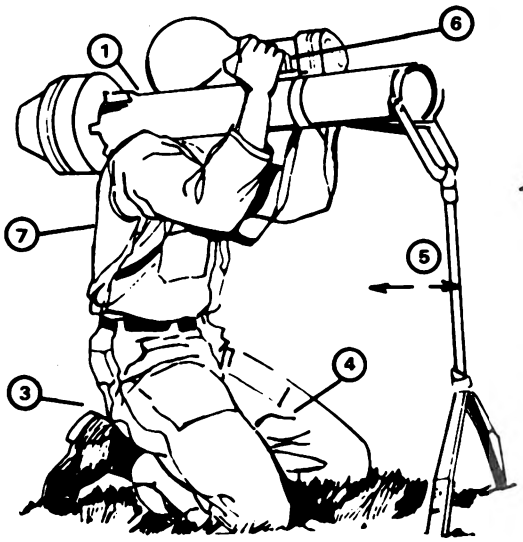
PERFORMANCE MEASURES (cont)



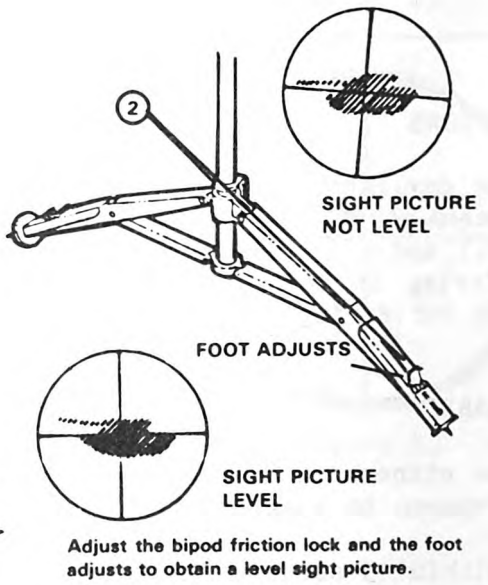


Figure 1.

(1) As the gunner, place the launcher on your right shoulder as close to the curve of the neck as possible (fig 1, item 1).

(2) Adjust the bipod legs and feet for height and proper leveling (fig 1, item 2).

(3) Point the toes of both feet into the ground with the heels elevated and buttocks resting on the heels (fig 1, item 3).

(4) Place both knees on the ground and keep them spread wide (fig 1, item 4).

(5) Take the slack out of the bipod by pushing forward or pulling backward (fig 1, item 5).

(6) Grasp the left portion of the tracker (optical sight between the shock absorber) with the left hand and the trigger assembly with the right hand. The right thumb is positioned on the safety plunger, three fingers on the trigger lever and the little finger forward of the trigger lever (fig 1, item 6).

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PERFORMANCE MEASURES (cont)

(3) Spread your legs approximately shoulder-width apart, bend slightly forward at the waist until your eye is pressed firmly against the tracker, and brace against the front of a foxhole or sand bags--or the commander's cupola of an M113.

2. Steady hold factors:

a. Place the round in the meaty part of your right shoulder.

b. Place your right eye firmly against the eyeguard (make sure the eyeguard is adjusted for contour of the face), and adjust the optical sight to focus on the target.

Note. Your eye should be pressed as firmly as possible against the eyeguard so you cannot blink. Blinking your eye would probably cause you to lose control of the missile once it is fired.

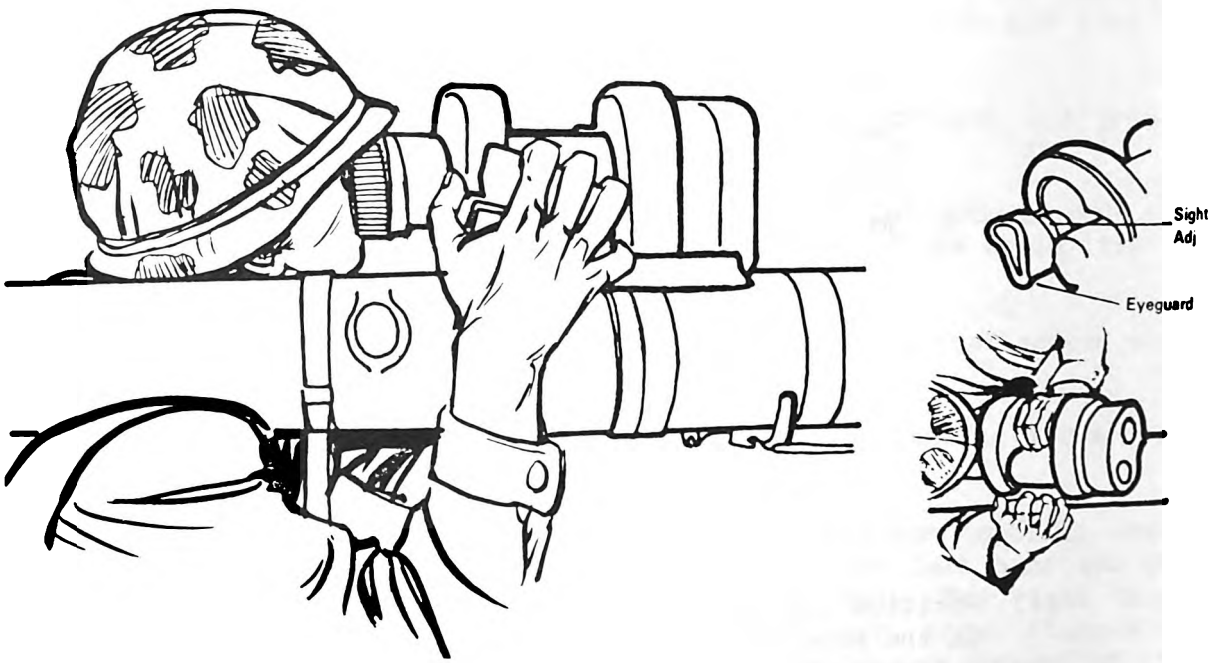

Figure 3.

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TASK SUMMARY 071-317-3304 (cont)

REFERENCES

TC 23-24, Dragon Medium Antitank Assault Weapon System M47, C1, chap 7, pp 68 and 69, para 7-4 thru 7-5.

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PERFORM IMMEDIATE ACTION PROCEDURES FOR A DRAGON MISFIRE

CONDITIONS

During daylight or darkness, in a field environment, with field clothing and combat equipment, given a DRAGON tracker mounted on a field handler trainer, and a misfire situation.

STANDARDS

Within 1 minute, perform immediate action procedures in accordance with the performance measures below.

PERFORMANCE MEASURES

If the DRAGON fails to fire:

1. Immediately re-squeeze the trigger and continue tracking the target for 15 seconds.
2. If the round still does not fire, cautiously feel the thermal battery (fig 1).

Figure 1.

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PERFORMANCE MEASURES (cont)

a. Simulate that the thermal battery is hot, and do the following:

(1) Remove the tracker from the round and place the round on the ground away from your firing site. Keep the round pointed toward the enemy; advise friendly troops in your vicinity of the misfire.

(2) Obtain a new round and mount the tracker on the new round.

(3) If possible, acquire previous target and continue with the mission.

b. Simulate that the thermal battery is cold, and do the following:

(1) Reseat the tracker on the round.

(2) Obtain target and attempt to fire again.

(3) If the round again fails to fire, cautiously feel the thermal battery.

(4) If the battery is still cold, remove the tracker from the round and place the round on the ground away from your firing site. Keep the round pointed toward the enemy; advise friendly troops in your vicinity of the misfire.

(5) Mount the tracker on another round and continue with your mission.

(6) If the second round also fails to fire, cautiously feel the thermal battery. If the battery is cold, the tracker is probably defective.

(7) If another tracker is available, replace the tracker and continue with the mission using previously unfired rounds.

REFERENCES

TM 9-1425-480-10, Operator's Manual; DRAGON Weapon System, M47, chap 2, pp 2-0 thru 2-10, para 2-8b.

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CONDUCT A SYSTEM SELF-TEST AND PREOPERATIONAL INSPECTION OF A TOW LAUNCHER AND ENCASED MISSILE

CONDITIONS

Given an assembled ground or vehicle-mounted TOW launcher, an encased missile, TM 9-1425-470-12, and DA Form 2404.

STANDARDS

1. Conduct a system self-test of the TOW launcher when either of the following conditions exist:

   a. After installation of the TOW on its organic carrier.

   b. Daily once the system is installed on the carrier.

   c. Before a missile is loaded.

   d. Any time you change locations using the extended travel configuration.

2. All defective components are reported.

3. Conduct a pre-operational inspection of the encased missile/ missile simulation round in accordance with the performance measures.

PERFORMANCE MEASURES

1. Conduct a system self-test (table 1).

   Note. A self-test uses battery power, so perform it rapidly.

   a. The elevation and azimuth meters on the missile guidance set indicate the operational condition of the various components of the launcher.

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PERFORMANCE MEASURES (cont)

(1) They will register either in-band or out-of-band (fig 1) when the TEST OPERATE switch is held in the TEST position and the SELF-TEST switch is rotated to each of the seven test positions.

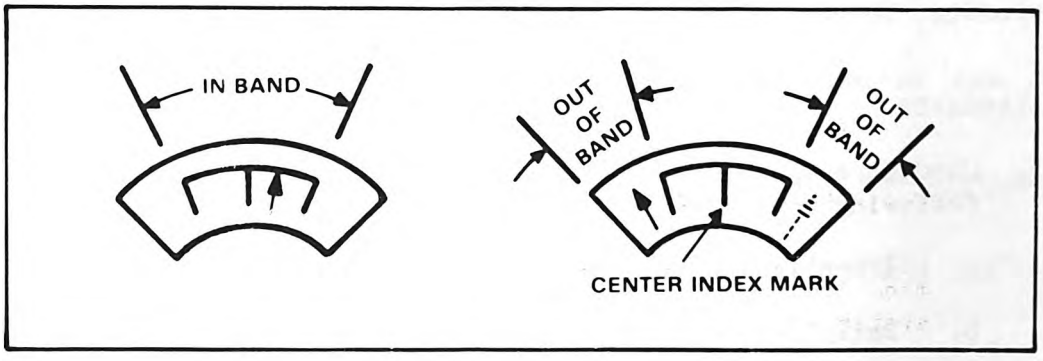

Figure 1.

(2) An out-of-band reading indicates a component is not functioning properly and corrective action is required.

b. Hold the TEST OPERATE switch in the TEST position and rotate the SELF-TEST switch to each position.

(1) Perform the actions specified in table 1 for each of the seven positions. The table lists the sequence, normal meter reading, and appropriate corrective action if a normal reading is not obtained.

(2) If corrective action is performed, other than boresighting, the whole self-test must be repeated.

WARNING: Do not conduct a system self-test unless the launcher is assembled. The traversing unit must be connected to the missile guidance set by the coil cord, and the day sight tracker must be properly mounted.

c. When checking position 7, boresight alignment of the optical sight and infrared tracker, align the meter needles as closely as possible with the center index mark.

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PERFORMANCE MEASURES (cont)

(1) If they are not aligned, adjust the boresight knobs on the optical sight one at a time.

(2) In addition to when the system is assembled, check position 7 (boresight) at the following times:

(a) After cross-country movement.

(b) After a change in temperature of 10 degrees.

(c) Every 4 hours.

3. Preoperational inspection (table 2).

a. The preoperational inspection outlined in table 2 should be made periodically during operations as well as when the system is assembled.

b. The checks do not necessarily have to be performed in the order listed.

4. Inspection of an encased missile.

a. Check the outside of an encased missile for oil, dirt, grease, dents, gouges, punctures, or cracks.

b. Check the humidity indicator to make sure it is blue.

c. Make sure the dust cover is present.

d. Make sure the forward handling ring and quick release clamp are present and secured.

e. Make sure the indexing lugs are not damaged.

Note. If you are in a live fire training situation and the humidity indicator is pink, do not fire the missile.

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PERFORMANCE MEASURES (cont)

STEP	PROCEDURE	NORMAL INDICATIONS		CORRECTIVE ACTIONS FOR OTHER THAN NORMAL READINGS
		AZIMUTH METER	ELEVATION METER	
1	Set SELF-TEST switch to position 1	In-band	In-band	1. Replace battery assembly (and tag for recharging). 2. Replace missile guidance set if trouble remains.
2	a. Set SELF-TEST switch to position 2.	In-band	In-band	Replace missile guidance set.
	b. Release elevation lock and move launch tube: UP DOWN LOCK ELEVATION LOCK		Moves Right Moves Left	1. Replace traversing unit. 2. Replace missile guidance set if trouble remains.
	c. Release azimuth lock and move launch tube: RIGHT LEFT LOCK AZIMUTH LOCK	Moves Right Moves Left		
3	Set SELF-TEST switch to position 3.	In-band	In-band	Replace missile guidance set.
4	Set SELF-TEST switch to position 4.	In-band	In-band	Replace missile guidance set.
5	Set SELF-TEST switch to position 5. (TEST OPERATE switch must be in TEST position when SELF-TEST switch is rotated.)	In-band after 8 to 12 seconds.	Rotate in and out of band and then remain in-band after 8 to 12 seconds.	Replace missile guidance set.
6	Set SELF-TEST switch to position 6	In-band	In-band	Replace missile guidance set.

Table 1.

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PERFORMANCE MEASURES (cont)

STEP	PROCEDURE	NORMAL INDICATIONS		CORRECTIVE ACTIONS FOR OTHER THAN NORMAL READINGS
		AZIMUTH METER	ELEVATION METER	
7	Set SELF-TEST switch to position 7 (Shade lens in sunlight to prevent needles from oscillating.) *Exact alinement with index mark is not necessary, but it should be alined as close as possible without using excess battery power	a Tracker motor in optical sight is running b *Center Index Mark	*Center Index Mark	a Replace optical sight b Adjust focusing to T3 or more c. Adjust azimuth and elevator knobs on the optical sight one at a time to obtain correct readings WARNING IF THERE IS NO NEEDLE MOVEMENT ON THE AZ OR EL METER WHEN YOU ADJUST THE BORESIGHT KNOBS, RELEASE THE TEST OPERATE SWITCH. Get a good sight and do the test again. If there is still no movement, REPLACE THE MISSILE GUIDANCE SET. (It was probably damaged by the first sight.) Do not hook up the first optical sight with another MGS. Turn it in to your maintenance support unit for checkout. d If a normal reading cannot be easily obtained because the needles are fluctuating: (1) Release TEST OPERATE switch and preset boresight knobs to their center position (2) Push TEST OPERATE switch and adjust knobs for normal indication. e. Replace the optical sight, missile guidance set, and traversing unit, in that order, if trouble remains.
8	Set SELF-TEST switch to position 1.	In-band	In-band	Same as step 1.
9	Release TEST OPERATE switch and rotate SELF-TEST switch to unmarked position			

Table 1 (cont).

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PERFORMANCE MEASURES (cont)

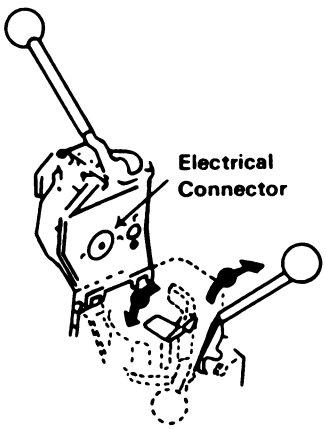
STEP	ITEM	PROCEDURE	NORMAL FUNCTION
1	Meter Lights	1. Push TEST OPERATE switch to test. 2. Release switch.	1. Lights illuminate. (Shade meters on sunny days.)
2	Reticle Light	1. Set reticle light switch to ON and focus crosshairs. 2. Return switch to OFF.	1. Crosshairs illuminate. (Cover lens during daylight.)
3	Trigger	1. Lift trigger protective cover. Depress and release trigger. 2. Close trigger protective cover.	1. Trigger springs back.
4	Bridge Clamp 	1. Raise bridge clamp. 2. Check electrical connector. (Arming lever should not be raised.) 3. Close bridge clamp and lock. 4. Raise and lower arming lever. 5. Raise locking handle slowly to check wire cutter.	1. Bridge clamp operates with no binding. 2. Clean and free of dirt or grease. 3. Bridge clamp is tightly secured. 4. Electrical connector protrudes and retracts. 5. A click can be heard.
5	Launch Tube	1. Check breech and bore. 2. Alinement and security.	1. Free of foreign material. 2. Lugs properly seated and launch tube latch locked.

Table 2.

REFERENCES

TM 9-1425-470-2, Operation and Organizational Maintenance for TOW, C4, chap 2, p 2-18.

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PERFORM IMMEDIATE ACTION FOR A TOW MISFIRE

CONDITIONS

Given an assembled and loaded TOW launcher (ready to fire), two encased missiles, and a misfire situation (missile failed to launch 1.5 seconds after trigger was pressed).

Note. For training, use a missile simulation round instead of encased missile.

STANDARDS

Within 1 minute, perform immediate actions in a sequence that will allow a gunner to continue engagement of a target.

PERFORMANCE MEASURES

1. Take immediate-action procedures to eliminate the malfunction and continue the mission in the fastest and safest manner.

2. Always remember, when a misfire occurs, it could just be a delay in the firing circuits.

   WARNING: Remain clear of the front and rear of the launcher at all times.

3. Perform each action in the order listed in the following table:

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PERFORMANCE MEASURES (cont)

IMMEDIATE ACTION PROCEDURES FOR A MISFIRE

ACTION	RESULT
1. Press the trigger again.	If the missile fails to fire, perform step 2.
2. Continue to track and alert the crew.	a. If it fires, you want to hit the target and not endanger the crew. b. Perform step 3.
3. Check battery power (self-test position 1).	a. Out-of-band reading: replace the battery and attempt to fire. b. In-band reading: Perform step 4.
4. Check the coil cord connection to missile guidance set.	a. Tighten if loose and attempt to fire. b. If tight, perform step 5.
5. Check the bridge clamp locking handle.	a. Lock fully and attempt to fire. b. If locked, perform step 6.
6. Lower and raise the arming lever.	a. Attempt to fire. b. Fails to fire, perform step 7.

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PERFORMANCE MEASURES (cont)

ACTION	RESULT
7. Lower and raise the arming lever again.	a. Attempt to fire. b. Fails to fire, perform step 8.
8. Close the trigger protective cover, lower the arming lever, and lock the elevation and azimuth locks.	The arming lever must be lowered, or the command-link wires may be cut when step 9 is performed.
9. Open the bridge clamp and remove the encased missile.	Place the missile pointing in the direction of the enemy where it does not present a danger to friendly personnel.
10 Load another missile.	Continue the mission.

Note. For a training misfire, wait 30 minutes after the last firing attempt before removing the missile. After the missile has been removed from the launcher and placed a safe distance from troops, notify EOD.

REFERENCES

None.

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ENGAGE A TARGET WITH A TOW

CONDITIONS

Given a loaded and armed TOW weapon system correctly positioned for firing, a sector of fire, an engageable target entering the sector fire within TOW range, and proper squad leader fire commands (using the command "FIRE").

STANDARDS

1. Acquire and track the target upon being given the target identification/location.

2. Fire the missile upon being given the command of "FIRE," in accordance with performance measure 4c.

PERFORMANCE MEASURES

1. Place your eye well into the rubber eyepiece.

2. Place both hands firmly on the control knobs.

3. Situate your body so there is no contact between your shoulder and the encased missile. Your only contact with the launcher is with your hands and your eye. Assume a firing position that is confortable. An uncomfortable position causes muscle tension that affects your ability to track smoothly.

   Note. When firing from the ground, you should kneel on one or both knees.

4. Acquisition, tracking, and firing.

   a. Acquisition. Once a target is sighted, acquire it in the optical sight, raise the trigger protective cover, and establish a smooth tracking rate, keeping the crosshairs on the center of the visible mass of the target.

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PERFORMANCE MEASURES (cont)

b. Tracking

(1) To move the launch tube left or right, apply a smooth, steady force to both control knobs by pushing on one and pulling on the other and rotating your body from the waist up as the launcher moves.

(2) To elevate or depress the launch tube, apply a smooth, steady twisting force to both control knobs. Applying pressure to only one control knob, or uneven pressure, makes it more difficult to track smoothly.

(3) Maintain the same arm, shoulder, and head position throughout an engagement. Any change in body position other than leaning with the controls will cause a jerking motion. This could result in an erratic maneuver and possible ground impact after the missile is fired.

c. Firing.

(1) Take a deep breath and let part of it out just before pressing the trigger. Proper breath control is particularly important during the first and last 400 meters of missile flight. Improper breathing will cause you to track poorly.

(2) Once the trigger is pressed, there is a 1.5-second delay before the missile is launched. This delayed firing of the launch motor can cause you to flinch or jerk the control knobs if you aren't prepared for it.

(3) There are two noises you should be prepared for once you press the trigger:

(a) The first noise is a "POP." This is the gyro being activated. It is not loud, but it may cause you to think a misfire has occurred and you may not be prepared for the next noise.

(b) The second noise is the launch motor firing. This is a loud noise similar to the LAW firing.

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PERFORMANCE MEASURES (cont)

(4) One effect caused by the firing of the launch motor (other than noise) that can be distracting is the backblast. The dust, smoke, heat, and debris from the backblast may cause you to flinch.

(5) When the missile appears in the sight picture, ignore it. Never try to fly the missile. If you are distracted, your tracking becomes poor and your chances of hitting the target are reduced. Continue to track the target at a smooth tracking rate until missile impact.

REFERENCES

None

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LOCATE MINES BY PROBING

CONDITIONS

Given an area in which mines have been emplaced, and metallic and non-metallic probing instruments.

STANDARDS

Locate and uncover all mines in the designated area without detonating any of them.

PERFORMANCE MEASURES

WARNING: When you know or suspect that the mines have magnetically influenced fuzes, make sure you do not carry any iron or steel gear in the immediate vicinity of the mines. Items such as helmets, bayonets, weapons, and pistol belts should be kept outside the field.

1. Roll your sleeves up and remove watches and rings to increase your overall sense or touch before probing.

2. Probe for mines:

   a. Select a non-metallic probe.
   b. Move on hands and knees, or prone. Look and feel upward and forward to find tripwires and pressure prongs.
   c. After looking and feeling, probe every 2 inches (5 centimeters) across a 1-meter front. Push the probe gently into the ground at an angle less than 45 degrees from the horizontal, putting just enough pressure on the probe to sink it slowly into the ground (figs 1 and 2).

      WARNING: If pushed straight down, the tip of the probe may detonate a pressure mine.

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PERFORMANCE MEASURES (cont)

d. If the probe does not go into the ground freely, pick or chip the soil away with the tip of the probe and gently remove the loosened soil with your hand.
e. When a solid object is touched, stop probing and remove the soil to find out what the object is.
f. If a mine is found, remove enough earth to show what type of mine it is, then mark it and report its exact locations.

Figure 1. Probing

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EMPLACE AND RECOVER AN ELECTRICALLY-ARMED CLAYMORE MINE

CONDITIONS

Given an M18A1 claymore mine with accessories.

STANDARDS

1. Within 7 minutes, the mine and accessories must be emplaced and a functional firing circuit test conducted.
2. Select a covered firing position that is at least 16 meters to the side or rear of the mine.
3. Within 7 minutes after being instructed, recover the mine and accessories. The mine and accessories must be replaced in their original container.

PERFORMANCE MEASURES

1. Emplace an M18A1 mine.
   a. Check to make sure the mine and all accessories are in the bandoleer (fig 1).

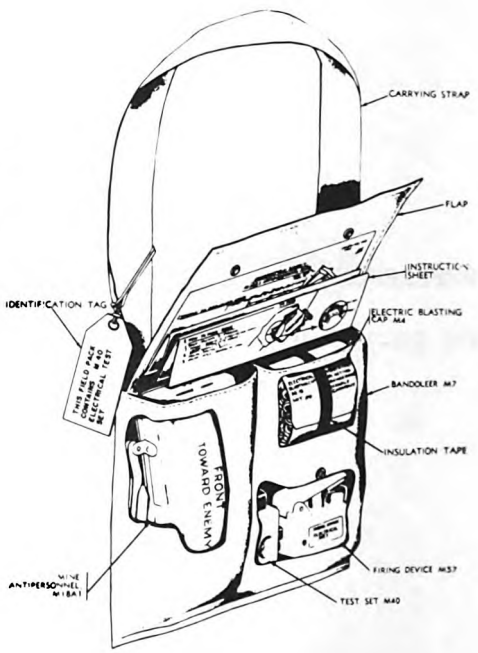

Figure 1.

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PERFORMANCE MEASURES (cont)

b. Read the instruction sheet attached inside the bandoleer cover before installing the mine.

c. Remove the electrical firing wire, leaving the mine and other accessories in the bandoleer.

WARNING: During installation, the M57 firing device must be kept in the possession of the man installing the mine to prevent accidential firing by a second man.

d. Secure the shorting plug end of the firing wire at the firing position.

e. Place the bandoleer on your shoulder and unroll the firing wire to the position selected for emplacing the mine.

f. Remove the mine from the bandoleer; turn the legs rearward and then downward. Spread each pair of legs about 45 degrees, one leg to the front and one to the rear.

g. Place the mine with the part marked "FRONT TOWARD ENEMY" and with the arrow on top of the mine pointing in the direction of the desired area of fire.

2. Aim the mine.

a. Mines with slit-type peepsight.

(1) Select an aiming point which is about 50 meters (150 ft) to the front of the mine and about 2-1/2 meters (8 ft) above the ground.

(2) Position your eye 15 centimeters (6 in) to the rear of the sight. Aim the mine by sighting through the peepsight. The groove of the sight should be in line with the aiming point. The aiming point should be in the center of the desired area of coverage, and the bottom edge of the peepsight should be parallel to the ground that is to be covered with the fragment spray (fig 2).

b. Mine with knife-edge sight.

(1) Select an aiming point which is about 50 meters (150 ft) to the front of the mine and about 2-1/2 meters (8 ft) above the ground.

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PERFORMANCE MEASURES (cont)

(2) Position your eye about 15 centimeters (6 in) to the rear of the sight. Aim the mine by aligning the two edges of the sight with the aiming point (fig 2).

3. Arm the claymore for electrical firing.

a. Secure the firing wire about 1 meter behind the mine (fig 2).

b. Test the firing device, test set, and blasting cap assembly as described in figure 2, step 4.

WARNING: Make sure the combination shorting plug and dust cover is assembled to the connector of the firing wire before proceeding with the installation of the mine.

c. Unscrew one of the shipping plug priming adapters from the mine.

d. Slide the slotted end of the shipping plug priming adapter onto the firing wires of the blasting cap between the crimped connections and the blasting cap. Pull the excess wire through the slotted end of the adapter until the top of the blasting cap is firmly seated in the bottom portion of the shipping plug priming adapter.

e. Screw the adapter with the blasting cap into the detonator (fig 2).

WARNING: Make sure the face of the mine marked "FRONT TOWARD ENEMY" and the arrows on top of the mine point in the direction of the enemy.

f. Recheck the aim of the mine.

g. Camouflage the mine and, if possible, bury the firing wire.

h. Make sure you have in your possession the bandoleer and other accessories.

i. Move back to the firing position.

WARNING: The mine firing position should be in a foxhole or covered position at least 16 meters to the rear or side of the emplaced mine (fig 2).

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PERFORMANCE MEASURES (cont)

j. Before connecting the M57 firing device to the firing wire, make sure the safety bail is in the SAFE position (fig 2) and that all friendly troops within 250 meters of the front, sides, and 100 meters of the rear of the mine are under cover.

Note. Do not connect the firing device to the firing wire until the actual time of firing.

k. Fire the mine.
(1) Remove the dust cover on the firing device.
(2) Remove the combination shorting plug and dust cover from the end of the firing wire.
(3) Connect the firing device to the firing wire.
(4) Place the safety bail in the FIRE position.
(5) Squeeze the handle of the firing device.

4. Recover an M18A1 mine.
a. Make sure the safety bail is in SAFE position (fig 2).
b. Disconnect the firing wire from the firing device.
c. Replace dust covers on the firing wire and firing device.
d. Remove the blasting cap from the mine and replace the shipping plug.
e. Reroll the firing wire.
f. Remove the mine from its emplacement.
g. Repack the mine and accessories in the bandoleer.

REFERENCES

FM 23-23, Antipersonnel Mine M18A1 and M18, para 12b(6), (7), p 14.
TEC 947-071-0106-F, Claymore Mines.
TEC 947-071-0107-F, Electrical Arming and Firing.
TEC 947-071-0108-F, Nonelectrical Arming and Firing.
TEC 947-071-0109-F, Disarming, Recovery, and Emergency Destruction Procedures.
TEC 947-071-0110-F, Multiple Emplacement and Review.

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LOCATE MINES WITH A METALLIC MINE DETECTOR

CONDITIONS

Given an AN/PSS-11 metallic mine detector, TM 5-6665-202-13, mine bonnets or white engineer tape, pistol belt, an area in which metallic mines have been placed, and a backup operator.

STANDARDS

You must locate and mark every mine in the designated area.

PERFORMANCE MEASURES

1. Assemble the mine detector.

   a. Loosen the pressure release valve on the front of the case (opposite handle) by two counterclockwise turns.
   b. Release the spring-type latches that secure the top case of the mine detector set to the bottom case.

      Note. The six latches are spring-loaded. When loosening them, place your thumb against the flat part of the latch to prevent injury to your fingers.

   c. Remove the transmitter assembly, head set, search head assemblies, and one silver chloride battery from the case.
   d. Remove battery cap from the receiver and transmitter assembly and insert the silver chloride battery, negative end first. Connect the battery cap by turning it clockwise until snug.

WARNING: Never throw silver chloride batteries into a fire. They may explode.

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PERFORMANCE MEASURES (cont)

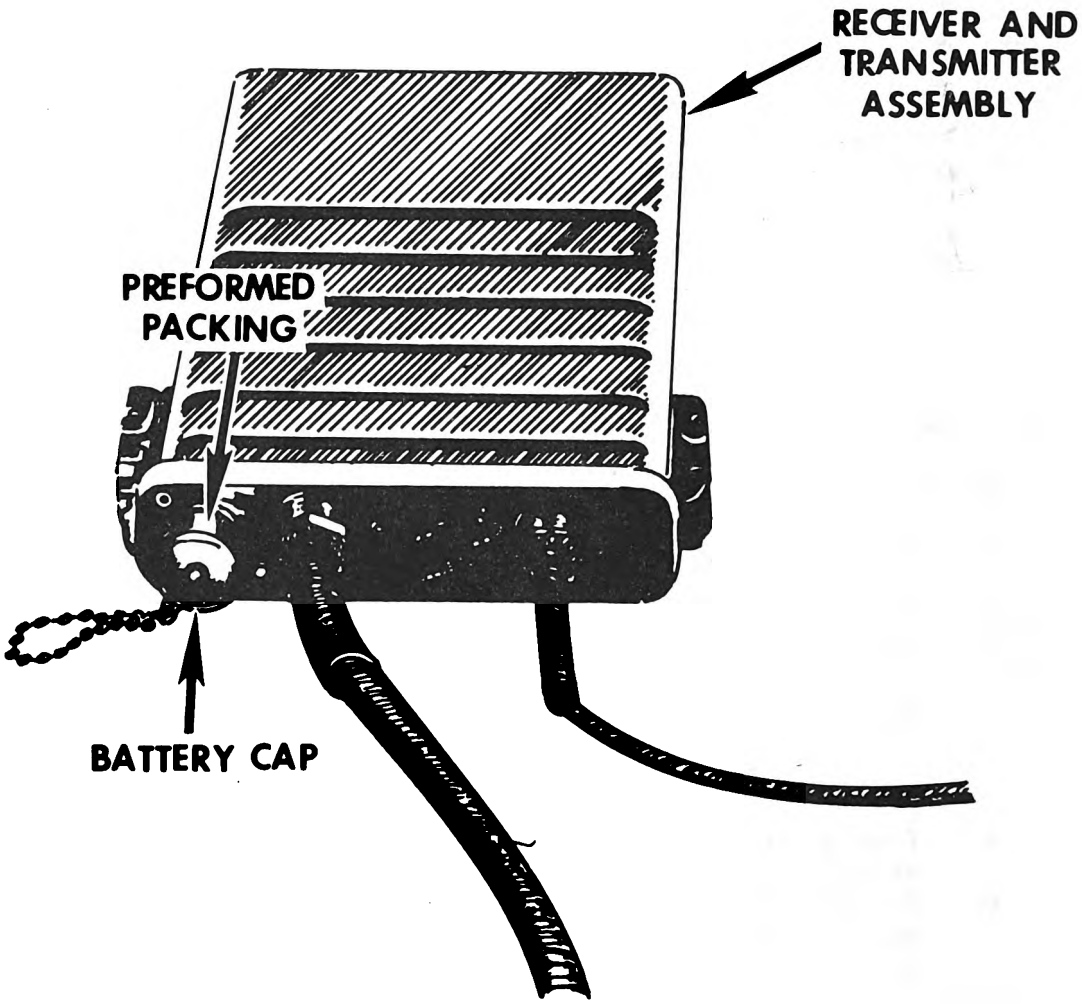

Figure 1.

e. Connect the extension handle to the search head assembly. Pull back on the collar to expose the keypin with slot in the lock ring. Slide the collar forward.

f. Extend the handle to the desired length by loosening and pulling out extensions and retightening collets.

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PERFORMANCE MEASURES (cont)

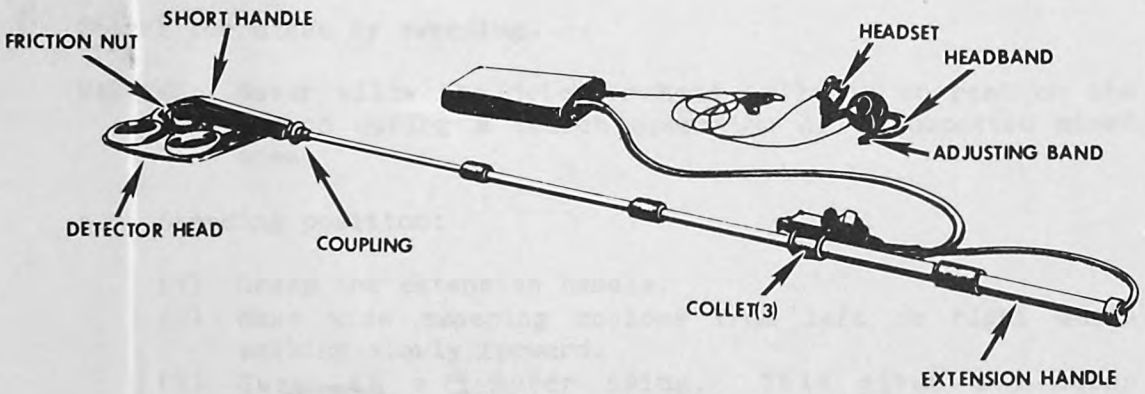

Figure 2.

g. Attach the audio frequency receiver transmitter assembly carrying case to your pistol belt by using the keeper and slide provided.
h. Put the headset on. Make sure the pressure on the earcups is enough for a partial seal against external noises.

2. Tune the detector.

a. With the headset on, hold the search (detector) head 5 feet above the ground, away from all metal.
b. Turn the power selector switch to the intermediate position.

WARNING: Do not start the detector unless the detector head is at least 5 feet from metallic objects. Voltage induced by metallic objects can seriously damage untuned circuits.

c. Align the index mark on the fine X control knob with the related index mark on the control box. Align the fine R control knob in like manner. (You should hear a 2,500 cps ringing signal in the headset.) Adjust control knobs until a minimum null signal is obtained.
d. If minimum null is not obtained, turn the power selector switch to the LO position and repeat the above step.

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PERFORMANCE MEASURES (cont)

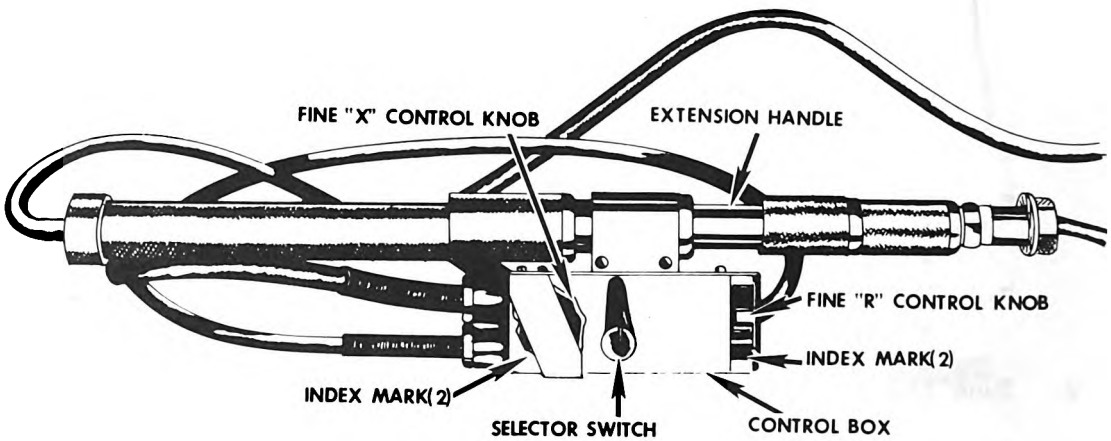

Figure 3. Power selector switch.

e. If there is no signal:

(1) Check the battery for correct installation and inspect cables and all connections for breaks.
(2) Check the color-coded modules for faulty operation by process of elimination. Each module has different plug-in pins. (A complete set of extra modules is located in the carrying case.)
(3) When minimum null is obtained, perform varimeter phasing and sensitivity checks.

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PERFORMANCE MEASURES (cont)

WARNING: If minimum null cannot be obtained, report the condition to organizational maintenance.

3. Search for mines by sweeping.

WARNING: Never allow the detector head to touch or rest on the ground during a search operation of a suspected mined area.

a. Standing position:

(1) Grasp the extension handle.
(2) Make wide sweeping motions from left to right while walking slowly forward.
(3) Sweep in a 3-meter swing. This gives a 2-meter clearance with a half-meter overhang on each side.

b. Prone position:

(1) Collapse the extension handle to the desired length and adjust the detector head for proper angle of operation.
(2) Assume the prone position, supporting your weight on your left forearm.
(3) Holding the extension handle in your right hand, use your right forearm as leverage on the rear of the extension handle to keep the detector head parallel with the ground.

Note. Left-handed personnel will reverse the prone position procedure.

(4) Make wide sweeping motions from left to right while slowly crawling forward.

WARNING: The detector head cover must be installed on the search head whenever the detector is operated on rough terrain, to prevent damage to the search head.

4. Adjust position controls for proper operation.

a. Low position. Used in areas containing shrapnel or metallic fragments. Hold search head 3 to 8 inches above the ground. The detector will signal only large objects at this adjustment.

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PERFORMANCE MEASURES (cont)

b. Intermediate position. Used in areas strewn with small metal fragments and to search for small antipersonnel mines. Hold search head 3 to 8 inches above the ground. At this adjustment, the detector is more sensitive than at the low position.
c. High position. Used in nonmetallic soil to detect metal fuzed mines or nonmetallic fuzes with metal firing pieces. Hold the search head 3 to 5 inches above the ground. At this adjustment, the detector is more sensitive than at low position.

5. Locate the exact positions of buried metallic objects.

a. When a sharp change in signal volume is heard, move the detector head slowly from side to side.
b. An increased signal will be noted as either side of the detector head is passed over the metallic object.
c. A decreased signal will be noted as either side of the detector head moves over the buried object.
d. If no decrease in signal volume is noted as the center of the detector head moves over the buried object, a saturated condition exists. If this occurs, raise the detector 1 or 2 inches higher and repeat the sweeping motion.
e. If necessary, raise the detector head until a definite change in volume is evident when the detector head moves over the buried object. At this point, the detector head is directly over the location of the buried object.

WARNING: Always keep the detector head parallel to the ground during a search operation. Never allow the detector head to drop or rest on the ground during mine detecting operations in a suspected area.

6. As you locate the mines, have the backup operator mark the mines.

a. By placing a mine bonnet over the mine.

b. By using a field expedient, i.e. engineer tape.

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REFERENCES

FM 20-32, Mine/Countermine Operations at the Company Level, para 13-4.
TM 5-6665-202-13, Operator, Organizational, and Direct Support Maintenance Manual: Mine Detecting Set AN/PSS-11, chap 2.

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LOCATE MINES WITH A MICROWAVE MINE DETECTOR

CONDITIONS

Given an operational AN/PRS-7 microwave mine detector, mine bonnets or white engineer tape, pistol belt, TM 5-6665-292-13, a back-up operator and an area in which metallic and non-metallic mines have been emplaced.

STANDARDS

Locate and, using standard markings, mark all enemy mines in the designated area without detonating any mines.

PERFORMANCE MEASURES

1. Assemble the mine detector.

    a. Open the pressure relief valve located on the front of the carrying case opposite the handle. Then open the carrying case by loosening the six latches and lifting off the top section.

        WARNING: The six latches are spring-loaded. When loosening them, place your thumb against the flat portion of the latch to prevent injury to your fingers.

    b. Remove the search head assembly with short handle attached, the long handle assembly with control box attached, and one battery.
    c. Unfasten the four latches which secure the top on the control box (fig 2) and insert the battery, terminal end toward the search head. Insert the plug into the battery. Then close and latch the top of the control box.
    d. Attach the long handle to the short handle by means of the quick-disconnect coupling. Engage and compress the spring-loaded coupling and twist 1/4 turn clockwise.

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PERFORMANCE MEASURES (cont)

e. Put on the headset with the headband forward. Adjust the headband and fasten the spring clip on the headset cable to the clothing.

2. Make preliminary adjustments.

a. Adjust the handle to the desired length by loosening the collets, extending the sections and tightening the collets.
b. Adjust the search head to the desired angle. Rest the search head assembly on the ground, loosen the slotted nut, move the handle to the angle desired, and tighten the slotted nut to secure the handle in position.

3. Check the mine detector for proper operation.

a. Set the selector switch on the control box to SEARCH.
b. Hold the search head approximately 5 inches above the ground and away from non-homogeneous objects.
c. Listen for a tone in the headset.
d. Move the search head back and forth over a non-homogeneous object and note the change in tone in the headset. Repeat the above steps for each POINT mode.
e. If a tone cannot be obtained, check for a low battery or a faulty module.

(1) To check for a low battery, replace the one in use with the spare in the carrying case. Attempt to obtain a tone as described above. If a tone can now be obtained, the removed battery is dead.
(2) To check for a faulty module, remove the top from the control box. Grasp the module on either side with your fingers and work it free. Take care not to damage the socket or module. Position the spare module to align it properly with the control box connector. Insert the module into the bracket and press carefully but firmly into the connector. Replace and latch the cover on the control box. After the substitution, repeat the process for obtaining a tone. If a tone is heard, the removed module is defective.

Note. If the above process fails to produce a tone, the complete set should be returned for maintenance.

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PERFORMANCE MEASURES (cont)

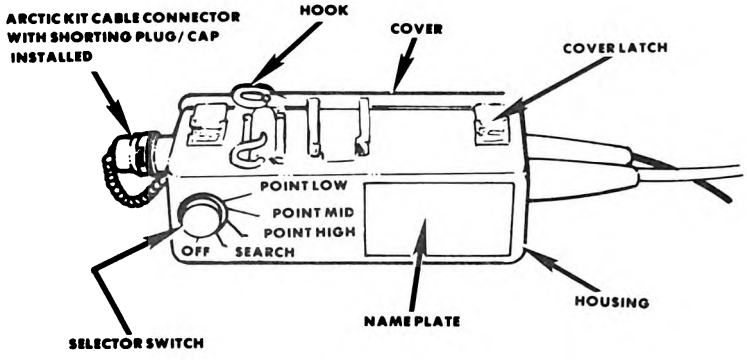

Figure 1. Cover box assembly.

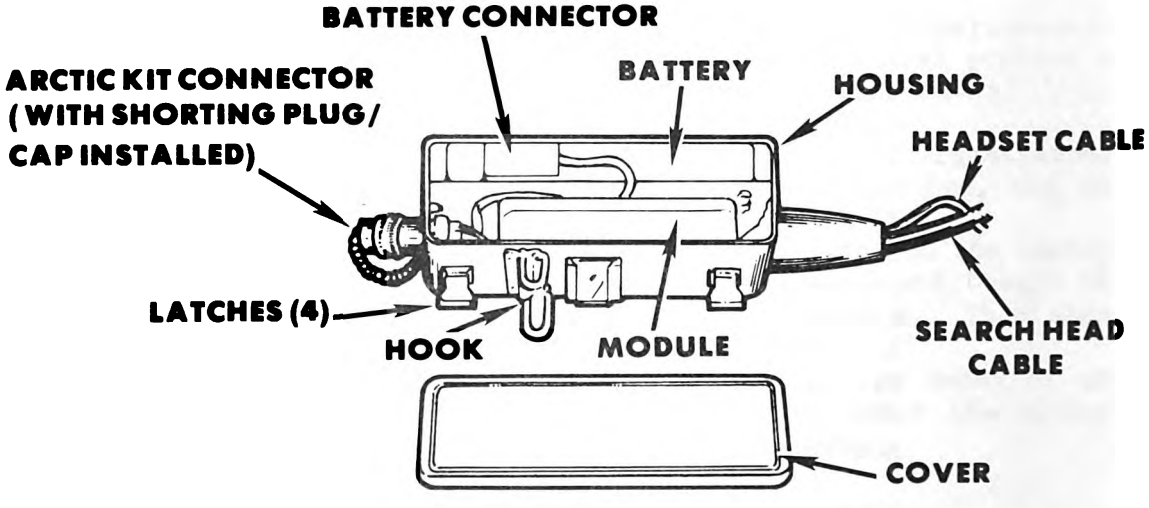

Figure 2. Control box assembly, top view, cover removed.

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PERFORMANCE MEASURES (cont)

4. Operate the mine detector.

   a. Turn the selector switch from OFF to SEARCH.
   b. Hold the search head over homogeneous soil. A low-level tone should be heard.
   c. Hold the search head approximately 2-1/2 inches above the ground.
   d. Sweep the search head from side to side in a 3-meter swing at a rate of about 2 to 3 feet per second. With each sweep, advance a distance just less than the width of the search head (Make sure the search head is parallel to the ground at all times).

      Notes. 1. When desired, the prone position may be used to sweep for suspected mines; however, the sweep area will be considerably smaller.

      2. An increase in the initial signal volume (background signal) in the headset when the search head is moved over some particular spot on the ground indicates a lack of continuity in the soil. A buried mine will give a sharper, more pronounced signal than that resulting from a difference in soil.

5. Locate the exact position of a buried mine.

   a. If a buried subject is indicated, turn the selector switch from SEARCH to POINT HIGH.
   b. If necessary, reset the selector switch to a comfortable listening level; POINT MID or POINT LOW.

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PERFORMANCE MEASURES (cont)

Note. POINT HIGH produces the maximum sensitivity in the set. It is effectively used when the soil is non-magnetic and there is no metallic scrap or debris to influence operation of the equipment. POINT MID produces an intermediate sensitivity. It gives best results for operation over magnetic soil. It is also used to shut off interference from surface metallic objects.

POINT LOW is useful for operation over terrain covered with metallic debris and scrap, where a high exclusion will be eliminated, but large objects such as metallic mines, will yield adequate response.

Use MID POINT for outlining mines only. Do not search for mines in mode other than SEARCH. When operating while using the MID or LOW position, be extremely alert for mine indicating signals, since these lower level sensitivities do not disclose the presence of a mine as quickly as the HIGH level does. Keep the switch in the OFF position when the detecting set is not in use.

6. As you locate the mines, have the backup operator mark the mines:

   a. By placing a mine bonnet over the mine.

   b. By using a field expedient, i.e. engineer tape.

REFERENCES

FM 20-32, Mine/Countermine Operations at the Company Level, para 13-4.
TM 5-6665-202-13, Operator, Organizational and Direct Support Maintenance Manual: Mine Detecting Set, AN/PRS-11, chap 2.
TM 5-6665-292-13, Operator, Organizational and Direct Support Maintenance Manual: Mine Detecting Set, AN/PRS-7, w/C, chap 2, pp 2-1 thru 2-13.
TM 5-6665-293-13, Operator, Organizational, and Direct Support Maintenance Manual: Mine Detecting Set, AN/PRS-7, chap 1.

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PERFORMANCE MEASURES (cont)

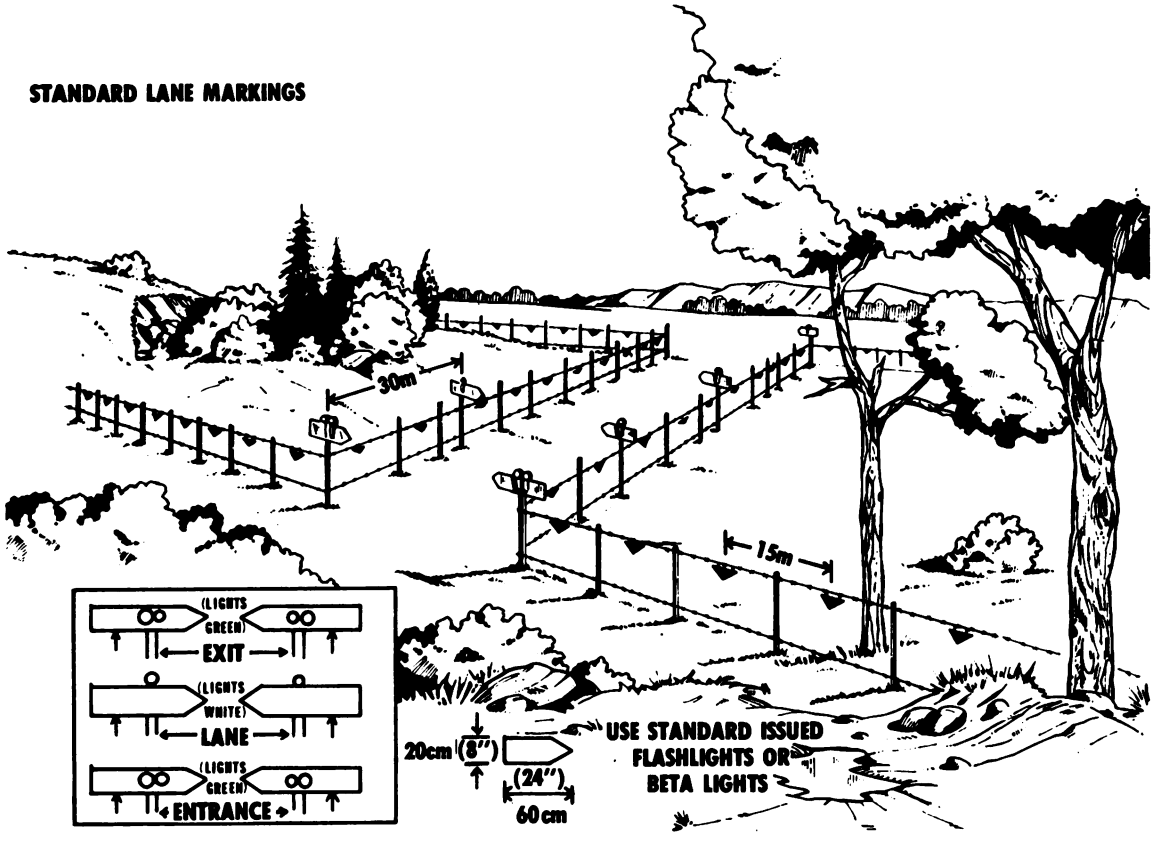

Figure 3. Standard lane markings.

REFERENCES

FM 20-32, Mine/Countermine Operations at Company Level, app H, pp 187 and 188.
FM 5-34, Engineer Field Data, chap 3, sec II, para 3-5, pp 60 and 61.

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EMPLACE AND RECOVER AN M14 ANTIPERSONNEL (AP) MINE

CONDITIONS

Given an M14 antipersonnel mine, one M22 mine fuze wrench, entrenching tool, and bayonet.

STANDARDS

1. Emplace and arm the mine without deviating from the performance measures. The mine must detonate when activated.

2. Disarm and recover the mine without detonation.

PERFORMANCE MEASURES

1. Inspect the mine.

    a. Examine the mine, if the mine is dented, cracked, or otherwise damaged, do not use it. Replace it with an undamaged mine.
    b. Using the M22 arming wrench, unscrew the shipping plug from detonator well in the bottom of the mine. Retain the shipping plug for future use. You may be required to disarm the mine and move it to another location.
    c. Visually inspect the position of the firing pin. If it extends into the detonator well, it is unsafe to use. Replace the shipping plug and set the mine aside if this happens.
    d. Inspect the detonator well for foreign material. If foreign material is present, hold the mine upside down and tap it gently against the palm of your hand until the material is removed. If the foreign matter cannot be removed, replace the shipping plug and replace the mine.
    e. Turn the mine so that the fuze with the safety clip is face up. Make sure the yellow indicating arrow points to safe.

2. Insert the detonator.

    a. Hold the mine in one hand. Pull firmly on the carrying cord attached to the safety clip until it is removed.

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PERFORMANCE MEASURES (cont)

b. Using the M22 arming wrench, turn the pressure plate clockwise from S to A (safe to armed). If the mine pressure plate snaps downward so that the top plate is level with the body of the mine, and the safety clip cannot be inserted, do not use the mine. Replace the mine with a new one.
c. Turn the plate counterclockwise to safe (S) and insert the safety clip.
d. Remove the detonator holder assembly from the mine box and screw it tightly into the detonator well. Make sure the rubber gasket is tightly wedged between the head and body so that no water can enter the mine. If water enters the mine, it may not detonate.

3. Bury the mine.

a. Dig a hole about 4 inches in diameter and just deep enough (about 1-1/2 inches) so that the pressure plate extends above the ground.
b. Check the ground surface at the bottom of the hole. Make sure the ground is solid enough to support the mine when pressure is applied to the pressure plate. If the ground is too soft, place a block of wood or other nonmetallic object in the bottom of the hole to support the mine.

4. Arm the mine.

a. Using the M22 arming wrench, turn the pressure plate to A (arm). Place the mine in the hole.
b. Hold the mine body tightly and remove the safety clip. Save the safety clip in case it is needed later.

5. Disarm the mine.

a. Carefully remove the camouflage and check the mine for booby-trapping and damage.
b. Replace the safety clip into the slots in the pressure plate.

WARNING: <u>If the safety clip cannot be replaced easily, don't try to disarm the mine.</u>

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PERFORMANCE MEASURES (cont)

c. Use the mine fuze wrench to turn the pressure plate counter-clockwise from the A to S position.
d. Remove the mine from the ground.
e. Turn the detonator holder and attached detonator gasket counter-clockwise with the mine fuze wrench and remove it from the detonator well.
f. Replace the shipping plug and gasket.

REFERENCES

FM 5-34, Engineer Field Data, chap 3, p 41.
FM 20-32, Mine/Countermine Operations at the Company Level, app C, para C-7.
TM 9-1345-203-12P, Landmines.

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EMPLACE AND RECOVER AN M16A1 ANTIPERSONNEL (AP) MINE

CONDITIONS

Given an M16A1 AP mine, an M25 mine fuze wrench, an M605 fuze, trip wire, at least two wooden stakes, and an entrenching tool.

STANDARDS

1. The mine must be emplaced and armed without deviating from the procedure outlined in the performance measures. The mine must detonate when activated.

2. The mine must be disarmed and recovered without detonation.

PERFORMANCE MEASURES

1. Install the mine without tripwires.

   a. Inspect the mine (fig 1).

      (1) Unscrew the shipping plug from the fuze well of the mine, using the closed end of the M25 fuzing wrench issued with the mine.
      (2) Examine the fuze well and flash tube for evidence of obstruction or foreign matter. To remove obstructions or foreign matter, turn the mine upside down and gently tap its bottom. If the mine appears to be damaged or in unsatisfactory condition, it should be carried to a safe place and destroyed.

   b. Fuze the mine (fig 1).

      (1) Carefully examine the M605 fuze assembly, including the crimping at the top of the fuze where it touches the top of the trigger, for evidence of damage. Check the safety pins to see that they move freely in the safety pin holes. Be sure the rubber gasket is around the fuze case.
      (2) Screw the fuze assembly into the fuze well of the mine and tighten it securely against the rubber gasket, using the open end of the M25 combination wrench.

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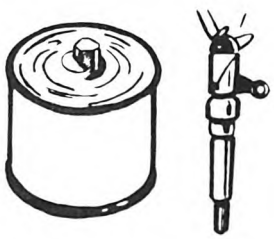
PERFORMANCE MEASURES (cont)

c. Bury the mine (fig 2).

(1) Dig a hole about 6 inches deep and 5 inches in diameter.
(2) Place the mine in the hole.
(3) Cover the mine up to the bottom of the release pin ring with soil (dirt) from the hole, pressing it firmly into place around the sides of the mine.
(4) Leave the release-pin ring and pressure prongs exposed.
(5) Arrange the pull cords on the safety pins for easy withdrawal.
(6) Remove the locking safety pin. After the locking safety pin is removed, the interlocking pin can be removed from the positive safety pin, which is located between the prongs.
(7) Complete covering the mine with dirt until only the pressure prongs are above ground level. Camouflage the installation.
(8) Remove the positive safety pin, thus arming the fuze. If positive safety pin is hard to remove, obtain a new fuze.



INSPECT THE MINE AND FUZE.

REMOVE SHIPPING PLUG AND SCREW ON FUZE.

Figure 1.

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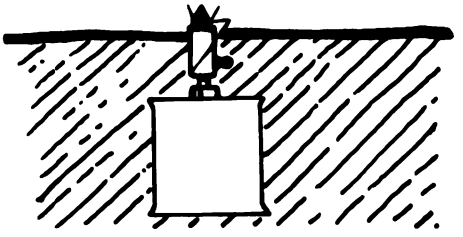
PERFORMANCE MEASURES (cont)



BURYING THE MINE FOR PRESSURE INSTALLATION

Figure 2.

2. Install the mine with tripwires (fig 3).

a. Inspect the mine (see performance measure 1).
b. Fuze the mine (see performance measure 1).
c. Bury the mine and install tripwires.

(1) Dig a hole about 6 inches deep and 5 inches in diameter.
(2) Lay the mine into the hole so that the tips of the prongs on the fuze will be just above ground level.
(3) Pack dirt tightly around and over the mine just below the release pin ring.
(4) Install two anchor stakes approximately 10m from the mine. Locate the stakes so that the wires, when attached, will form a wide V. A third trip wire may be installed, if you are directed by your supervisor.
(5) Fasten a separate wire to each anchor stake, then fasten the free ends to the release pin ring of the fuze.

WARNING: Do not install the trip wires so tight that they exert pull on the pressure ring, as this might cause the mine to detonate accidentally when the safety pins are removed.

(6) Leave enough slack in the trip wires to allow the top of the fuze to rotate and receive a direct pull on the release pin ring from either of the tripwires.
(7) Remove the locking safety pin, then remove the interlocking pin from the positive safety pin.
(8) Arrange pull cords on positive safety for easy withdrawal.
(9) Camouflage the installation, being careful not to cover the pullcord on the positive safety pin.

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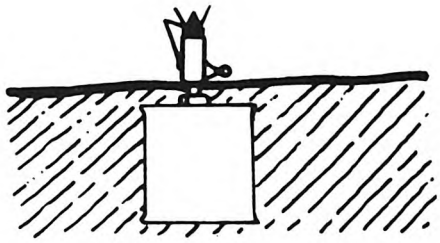
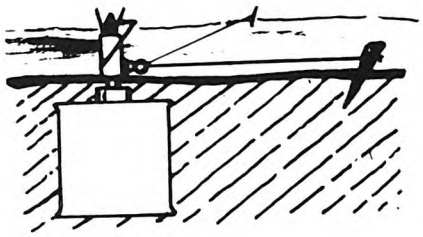
PERFORMANCE MEASURES (cont)

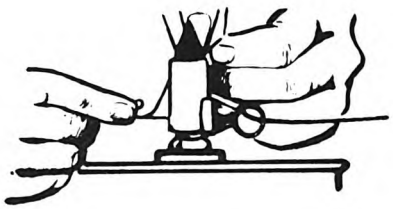
(10) Arm the fuze by removing the positive safety pin. If positive safety pin is hard to remove, obtain a new fuze.



TRIPWIRE INSTALLATION



ATTACH TRIPWIRES - FIRST TO ANCHOR, THEN TO PULL RING



REMOVE LOCKING SAFETY PIN FIRST. THE INTERLOCKING PINS SHOULD FALL FREE. THEN REMOVE POSITIVE SAFETY.

Figure 3.

3. Disarming the M16A1 AP mine with the M605 fuze.

a. Carefully remove the camouflage and check the mine for booby-trapping and damage.

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PERFORMANCE MEASURES (cont)

b. Insert the positive safety pin, then the interlocking pin and finally the locking safety pin.
c. Disconnect the tripwire from the anchor and then from the pull ring.
d. Lift the mine from the ground.
e. Unscrew and remove the M605 fuze from the mine.
f. Replace the shipping plug.

WARNING: The positive safety pin must be inserted first in case of fuze malfunction.

REFERENCES

FM 5-34, Engineer Field Data.
FM 20-32, Mine/Countermine Operations at the Company Level.
TM 9-1345-203-12&P, Landmines.

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EMPLACE AND RECOVER AN M21 ANTITANK (AT) MINE

CONDITIONS

Given an M21 AT mine with an M607 fuze, an M26 arming wrench, and an entrenching tool.

STANDARDS

1. Emplace and arm the mine according to the procedures outlined in the performance measures. The mine must detonate when activated.

2. Disarm and recover the mine without detonation.

PERFORMANCE MEASURES

1. Dig the hole for the mine about 10 to 12 inches in diameter and about 6 inches deep (fig 1).

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PERFORMANCE MEASURES (cont)

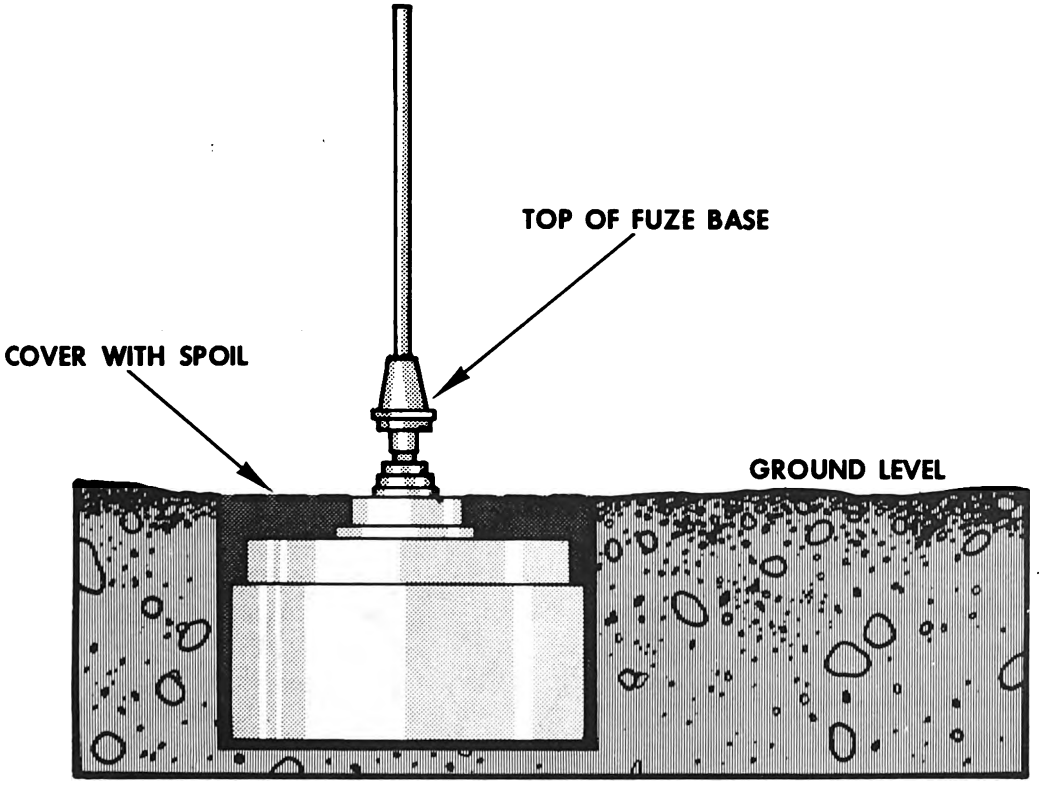

Figure 1. Recommended burial for a pressure fuze AT mine.

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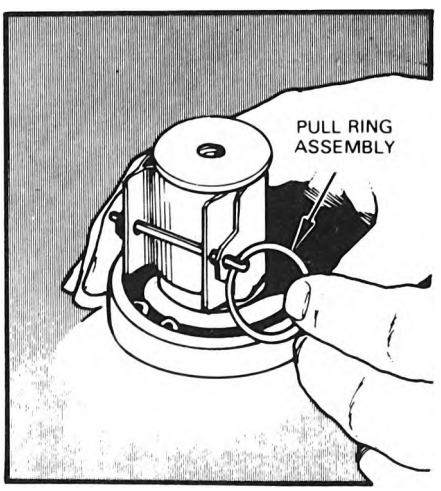
PERFORMANCE MEASURES (cont)

j. With the M26 arming wrench, replace the closing plug assembly by turning it clockwise until tight. The gasket of the closing plug assembly should be against the booster.
k. Turn the mine bottom down.
l. Using the shipping plug end of the M26 arming wrench, remove the shipping plug assembly from the fuze hold cavity of the mine.
m. Inspect the fuze hole cavity for foreign material. Remove any foreign material.
n. Using the closure end of the M26 arming wrench, remove the closure assembly from the M607 fuze. The gasket on the bottom of the fuze should remain in place.
o. Screw the fuze hand tight into the threaded fuze hole of mine charge cap.
p. Set the mine down. Prepare the hole in the ground if it's not already dug.
q. Check the bottom of the hole to make sure the ground is solid. If the ground is soft, place a board or other flat object under the mine.
r. Place the mine in the hole.
s. Press the ground firmly against the sides of the mine, leaving the fuze uncovered.
t. Remove the pullring assembly, band, and stop on the fuze. This arms the mine (figs 3 and 4).



PULL RING ASSEMBLY IN PLACE

Figure 3.

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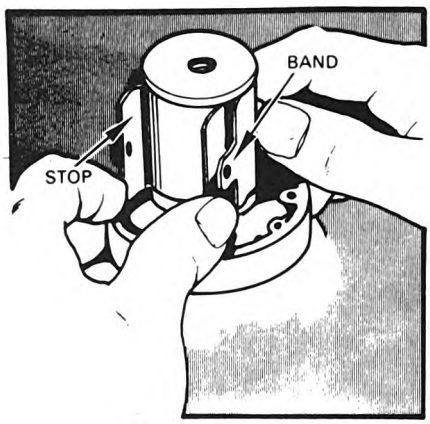
PERFORMANCE MEASURES (cont)



BAND AND STOP IN PLACE

Figure 4.

u. Retain the pull ring assembly, band, and stop for use when disarming the mine.

v. Camouflage the mine. Use the spoil to cover the top of the mine with a thin mound of earth of 5 centimeters (2 inches). Remove excess spoil and add twigs, grass, or material natural to the surroundings.

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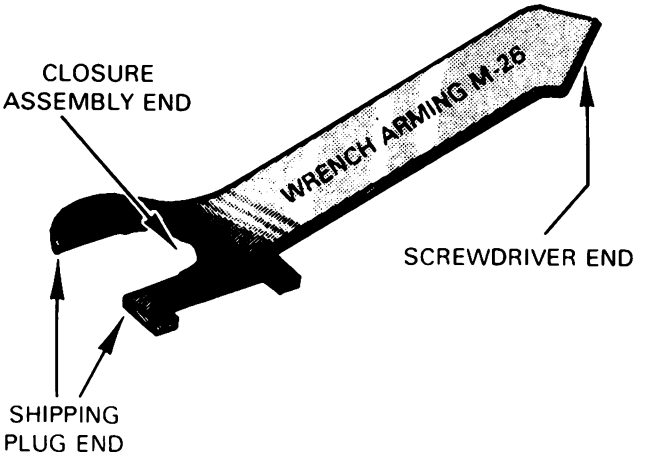
PERFORMANCE MEASURES (cont)



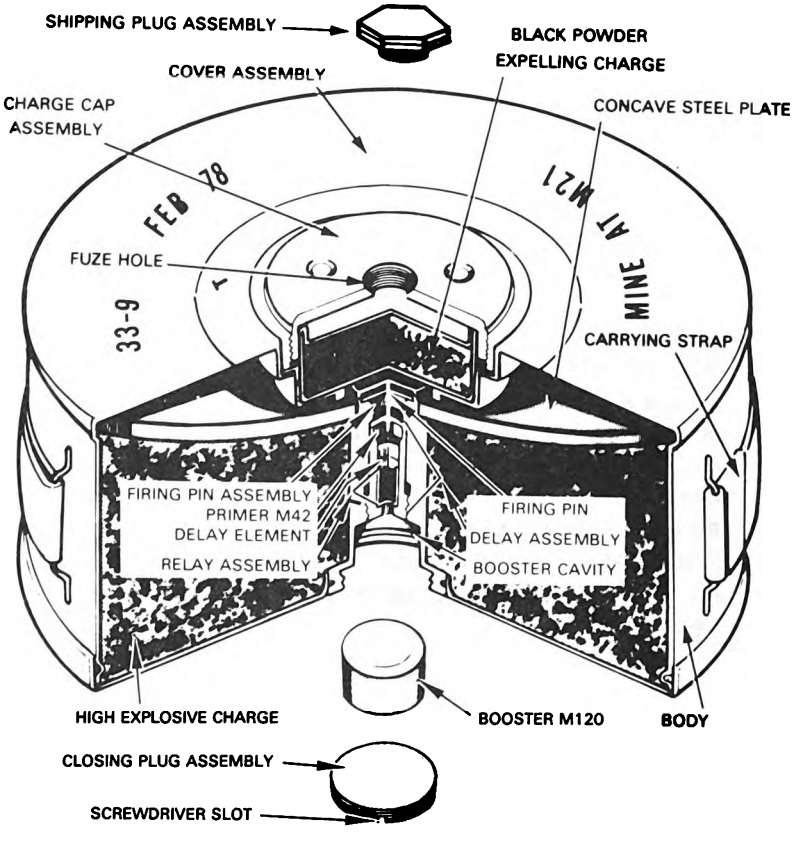


Figure 5.

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PERFORMANCE MEASURES (cont)

3. Using the M607 fuze with tilt rod, emplace the mine.

   a. Remove all components from the packing case.
   b. Follow the procedure in step 2 until after you have pressed the ground firmly around the sides of the mine, leaving the fuze uncovered.
   c. Assemble the extension rod into the threaded pressure ring of the M607 fuze. The extension rod adapters originally provided are not required.
   d. Make sure the extension rod is vertical and not tilted in any direction.

      Note. Use of the extension rod-equipped M607 fuze is preferable where vegetation cover is sufficient to help conceal the extension rod.

   e. Complete camouflaging the extension rods before arming the mine.
   f. Remove the pullring assembly, band, and stop on the fuze. This arms the mine.

4. Disarm and remove the M21 AT mine with an M607 fuze.

   Note. Be careful during disarming to prevent entry of dirt or other foreign matter into the fuze or mine openings.

   a. Carefully inspect the mine for any boobytrapping device before attempting to uncover the mine.
   b. Remove the camouflage material. Take care not to disturb the extension rod or the pressure ring until the band, the stop, and the pullring assembly have been placed back in the fuze.
   c. Carefully disarm the fuze by reassembling the band, the stop, and the pullring assembly to the fuze (figs 6 and 7). Squeeze the cotter pin ends together in order to reinsert them easily. After inserting the cotter pin, spread the ends again.

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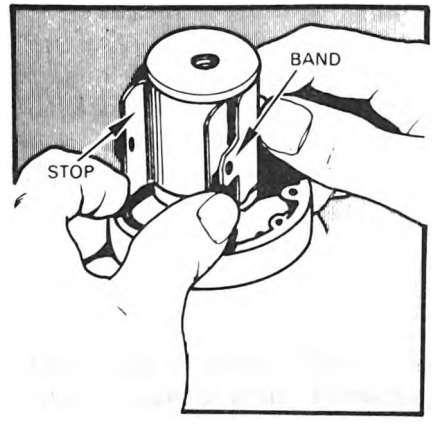
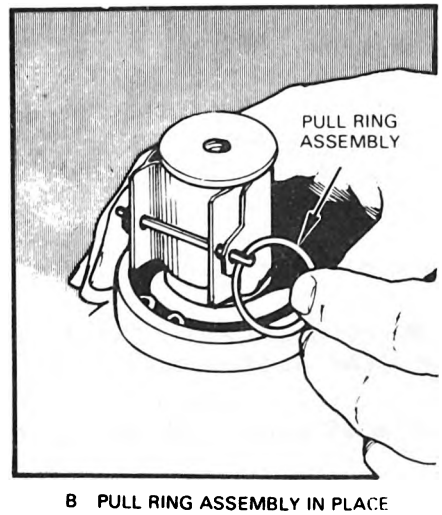
PERFORMANCE MEASURES (cont)



A BAND AND STOP IN PLACE

Figure 6.



B PULL RING ASSEMBLY IN PLACE

Figure 7.

d. Unscrew the extension rod and adapter. Take care not to damage them.
e. Remove the mine from the hole. The carrying strap may be used to lift the mine.
f. Using the closure assembly end of the the arming wrench, unscrew the fuze from the mine, and then screw the closure assembly to the base of the fuze.

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PERFORMANCE MEASURES (cont)

g. Using the shipping plug end of the arming wrench, replace and secure the shipping plug assembly in the top of the mine.
h. Using the screwdriver end of the arming wrench, unscrew the closing plug assembly from the bottom of the mine.
i. Using the screwdriver end of the arming wrench, remove the booster and replace and secure the closing plug.
j. Repack the mine and its components in the packing box.

REFERENCES

TM 9-1345-203-12-P, Operator's and Organizational Maintenance Manual: Land Mines, pp 2-41 thru 2-46.
FM 20-32, Mine/Countermine Operations at the Company Level, pp 147 and 148.

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EMPLACE AND RECOVER AN M15 ANTITANK (AT) MINE

CONDITIONS

Given an inert M15 AT Mine, an inert M603 fuze, an M20 mine fuze wrench, a sandbag, and an entrenching tool.

STANDARDS

1. Emplace and arm the mine according to the procedure outlined in the performance measures. The mine must detonate when activated.

2. Disarm and recover the mine without detonation.

PERFORMANCE MEASURES

1. Install the mine without antihandling devices.

   a. Dig a hole about 14 to 15 inches in diameter and about 5 inches deep.
   b. Place the soil removed from the hole in a sandbag for later use or removal from the minefield.
   c. When a mine is to be emplaced in sod, cut the turf and roll it back so it can be replaced over the mine.

      Note. The mine can be buried or surface laid as required.

   d. Carefully camouflage the emplaced mine whether buried or suface laid, in a manner that will not interfere with its function or effectiveness.
   e. Place the base of the mine on a firm foundation.

2. Lay and arm the mine.

   a. Using the arming wrench, unscrew the arming plug from the mine (fig 1).

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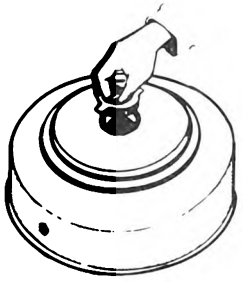
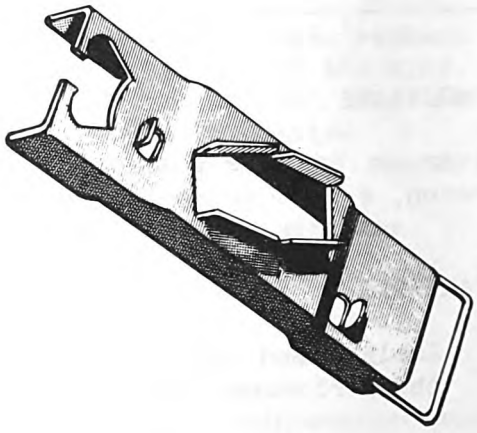
PERFORMANCE MEASURES (cont)





M20 arming wrench.

Figure 1.

b. **Inspect** the fuze well and arming plug threads to see that no foreign material is present. Remove any foreign material present.

c. **Remove** the M603 fuze from its metal shipping container and inspect it for serviceability. The green end of the detonator must show in the bottom of the fuze.

d. **Remove** the safety fork from the cover assembly of the M603 fuze (fig 2).

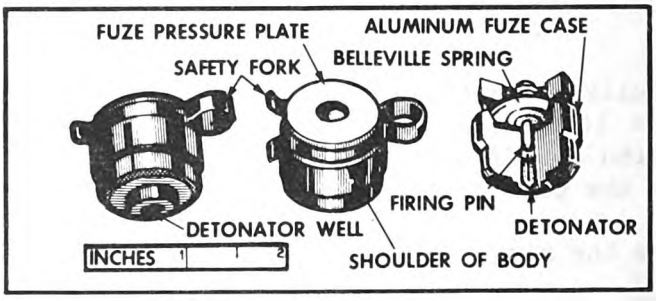


Figure 2.

e. **Insert** the fuze into the fuze well of the mine, pushing it down gently until it seats.

WARNING: Place no pressure on the pressure plate of the fuze when inserting it into the fuze well.

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PERFORMANCE MEASURES (cont)

Note. If the fuze will not seat, remove it and investigate the cause.

f. Make sure that the setting knob and shutter on the arming plug are in the SAFE position (fig 3).

SHUTTER IN SAFE POSITION

SETTING KNOB IN SAFE POSITION

Figure 3.

WARNING: The setting knob (dial) on the arming plug should never be left in the DANGER position.

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PERFORMANCE MEASURES (cont)

b. Replace all safety pins into the firing devices. Always replace the "positive" safety pin first; then remove the tripwire (fig 1).
c. Unscrew the activator. Replace the plug and gasket into the head of the activator.
d. Turn the setting knob of the arming plug to SAFE.
e. Remove the arming plug by turning it counterclockwise.
f. Remove the fuze by grasping the fuze pressure plate with the fingers. Insert the safety fork under the pressure plate.

WARNING: The fuze should come out easily. Do not attempt to remove the fuze if it is frozen in place or difficult to remove.

g. Unscrew the actuator from the secondary fuze well(s). Replace the plug and gasket into the head of the actuator.

REFERENCES

TM 9-1345-203-12&P, Operator's and Organizational Maintenance Manual: Land **Mines.**
FM 20-32, Mine/Countermine Operations at the Company Level.

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ASSEMBLE A NON-ELECTRIC/ELECTRIC DETONATION SYSTEM

CONDITIONS

Given a 1/2-pound of composition C4 or a 1/4-pound block of TNT, non-electric and electric blasting caps, a 6-foot length of time blasting fuze, 10 cap blasting machine, an M60 fuze ignition, a set of M2 crimpers, a galvanometer, and 50 feet of firing wire.

STANDARDS

1. Within 15 minutes, assemble a non-electric demolition system exactly as described in the performance measures. The demolition system must detonate when fired without injury to friendly personnel.

2. Within 15 minutes, assemble an electric demolition system exactly as described in the performance measures. The demolition system must detonate when fired without injury to friendly personnel.

PERFORMANCE MEASURES

1. Assemble the basic non-electric detonation system.

   a. Determine the burning rate of the time blasting fuze.

      (1) Cut and discard a 6-inch length from the free end of the time blasting fuze.

      Note. This prevents a misfire caused by moisture collecting in the exposed end.

      (2) Cut off a 3-foot section of the time blasting fuze from the free end.

      (3) Split one end of the fuze and insert a match head into the split.

      (4) Light the emplaced matchhead with another match and note the time it takes for the fuze to burn.

      (5) Determine the burning rate per foot by dividing the time in seconds by the length in feet.

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PERFORMANCE MEASURES (cont)

(6) Cut the time blasting fuze squarely across the time fuze and as long as necessary to allow the person detonating the charge to walk at a normal pace a safe distance away from the explosion.

b. Attach the blasting cap.

(1) Remove and inspect one blasting cap for dirt or foreign matter by looking into the open end.

(a) If dirt of foreign matter is present, hold the open end down.

(b) Shake it gently or bump the hand holding the blasting cap against the other hand to remove the particles.

WARNING: If the foreign matter does not come out, discard the blasting cap and select another. Never blow or tap the cap with a hard object or attempt to remove the foreign matter by inserting anything into the cap, because an explosion could result.

(2) Hold the time blasting fuze vertically with the square cut end up.

(3) Slip the blasting cap gently down over the time blasting fuze:

(a) Ensure the flash charge in the cap is in contact with the end of the time fuze to seat it.

Note. If contact is not made, it may misfire.

(b) If the end is flattened or too large to enter the blasting cap freely, roll the end of the time blasting fuze between your thumb and fingers until the size is reduced to permit free entry.

WARNING: Never force the time fuze into the blasting cap by twisting or any other method.

(4) Crimp the blasting cap.

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PERFORMANCE MEASURES (cont)

(a) Grasp the time blasting fuze between the thumb and third finger of the left hand.
(b) Extend the forefinger over the end of the cap to hold it firmly against the end of the time fuze, while keeping a slight pressure on the closed end of the cap with the forefinger.
(c) Slide the second finger down the outer edge of the blasting cap to guide the crimpers.

Note. This enables you to obtain accurate crimping, even in the dark.

(d) Crimp the blasting cap at a point 1/8 to 1/4 of an inch from the open end.

WARNING: A crimp too near the explosive in the blasting cap may cause detonation. Point the cap out and away from the body during crimping.

(5) Insert the time blasting fuze with blasting cap into the explosive block.

(a) Pass the end of the time blasting fuze through the primary adapter.

Note. The time fuze should easily move through the adapter.

(b) Pull the cap into the adapter until it stops.
(c) Insert the adapter into the cap well of the explosive and screw the adapter into place.

(6) Attach the M60 weatherproof fuze igniter.

(a) Unscrew the fuze holder cap two or three turns, but do not remove it.
(b) Press the shipping plug into the igniter to release the split collet and rotate the plug as it is removed.
(c) Insert the free end of the time fuze in place of the plug until it rests against the primer.
(d) Tighten the cap sufficiently to hold the fuze in place. This also weatherproofs the joint.

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PERFORMANCE MEASURES (cont)

(7) Fire the explosive.

(a) Remove the safety pin.
(b) Hold the barrel in one hand and pull the pull ring with the other.
(c) Make the final strong pull only after taking up the slack.

Note. In the event of a misfire, the M60 can be reset quickly without disassembly by pushing the plunger all the way in and attempting to fire as before.

2. Assemble the electric firing system.

a. Lay out the firing wire from the charges to the firing position after locating a firing position a safe distance away from the charges.

b. Test the firing wire.

(1) When using an M51 blasting cap test set:

(a) Check test set by connecting the posts with a piece of bare wire. The indicator lamp should flash when the handle is squeezed.

(b) Separate the firing wire conductors at both ends and connect those at the other end to the test set posts. Actuate the test set. The indicator lamp should flash. If it does not flash, the firing wire has a break.

(2) When using the blasting galvanometer:

(a) Check galvanometer by holding a piece of metal across its terminals. If the battery is good this should show a wide deflection of the needle, approximately 25 units (zero ohms).

(b) Separate the firing wire conductors at both ends, and touch those at one end to the galvonometer posts. The needle should not move. If it does, the firing wire has a short circuit.

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PERFORMANCE MEASURES (cont)

(c) Twist the wires together at one end and touch those at the other end to the galvanometer posts. This should cause a wide deflection of the needle (about 6-1/2 ohms or 23 to 24 units for a 500-foot length.) No movement of the needle indicates a point of high resistance which may be caused by a dirty wire, loose wire connection, or wires with several strands broken off at connections.

(d) Twist the free ends of the firing wire together to prevent an electric charge from building up in the firing wire.

c. Test each blasting cap to be used in the electric firing system.

(1) When using the M51 blasting cap test set:

(a) Check the test set as described above.

(b) Remove the short circuit shunt from the lead wires of the electric blasting cap.

(c) Attach one cap lead wire to one binding post and tie the other cap lead wire to the other post. Squeeze the test set handle. If the indicator lamp flashes, the blasting cap is satisfactory. If it does not flash, the cap is defective and should not be used. During the test, always point the explosive end of the blasting cap away from the body.

(2) When using the blasting galvanometer:

(a) Check the galvanometer as described above.

(b) Remove the short circuit shunt.

(c) Touch one cap lead wire to one galvanometer post and the other cap lead wire to the other. If the galvanometer's needle deflects slightly less than it did when the instrument was tested, the blasting cap is satisfactory; if it does not, the cap is defective and should not be used.

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PERFORMANCE MEASURES (cont)

(d) Twist the free ends of the cap lead wires together or shunt them with the short circuit shunt after each cap has been tested.

d. Connect the series circuit.

(1) Connect their lead wires into one of the two series circuits if two or more electric blasting caps are used.

(2) Test with the test set or galvanometer if more than 10 blasting caps are used in the series circuit or if the circuit is complicated.

(3) Connect the free ends of the blasting caps' lead wires to the test set binding posts when using the M51 blasting cap test set.

(4) Touch the free ends of the blasting caps' lead wires to the galvonometer posts when using the blasting galvanometer. This should cause a wide deflection of the needle.

(5) Splice the free cap lead wires to the firing wire.

e. Insert caps into charges.

f. Test the entire circuit.

(1) Move to the firing position and test the entire firing circuit with the test set or galvanometer.

(2) Splice the firing wires to the series circuit and move to the firing position.

(3) Connect the free ends of the firing wire to the binding posts when using the blasting cap test set. The indicator lamp should flash. If the lamp does not flash, the circuit is defective.

(4) Touch the free ends of the firing wire to the galvanometer posts when using the galvanometer. This should cause a wide deflection of the needle. If there is no deflection, the circuit is defective.

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PERFORMANCE MEASURES (cont)

(5) Shunt wires if the firing circuit is defective. Then go down range and recheck the circuit. If a defective splice is found, resplice the wires. If a cap is found defective, replace it. Continue to test all caps and wires in the circuit, then test the entire circuit again to make sure that all breaks have been located before attempting to fire the charge.

(6) Twist the free ends of the firing wire together.

g. Test operate the blasting machine.

h. Connect the blasting machine. Untwist the free ends of the firing wire and fasten them to the two posts of the blasing machine.

Note. If two or more electric blasting caps are connected in the same circuit, be sure that they are of the same type and made by the same manufacturer.

WARNING. For safety reasons, only one individual should be detailed to connect the blasting machine to the firing circuit and to fire the circuit. He should also either connect the blasting wires in the circuit or check their connection by on-the-spot visual examination.

REFERENCES

FM 5-25, Explosives and Demolitions, chap 2.
TEC 645-093-7321-F, Prepare Electric Firing System.

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PERFORMANCE MEASURES (cont)

(2) To destroy a railroad at non-vulnerable points, place 1-pound charges against alternate rail joints on both rails for a distance of 150m (fig 1). Repeat this procedure at 2,000-meter intervals.

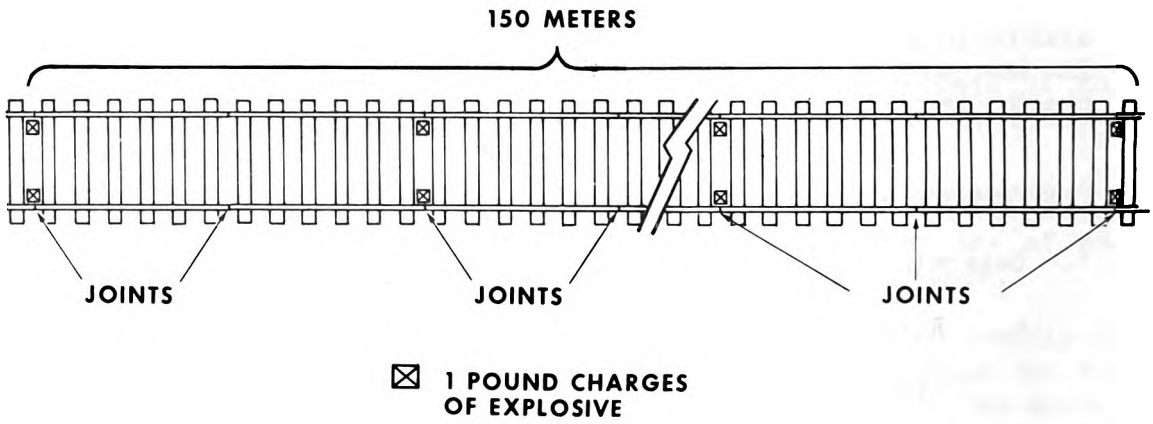

Figure 1 (cont).

b. Trees.

(1) To create an abatis, place the charge 5 feet above ground, on the side of the tree in the direction you want the tree to fall (fig 2).

(2) To create a helicopter landing zone or a parachute drop zone, place the charges in a ring around the base of the tree (fig 3).

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PERFORMANCE MEASURES (cont)

Figure 2.

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PERFORMANCE MEASURES (cont)

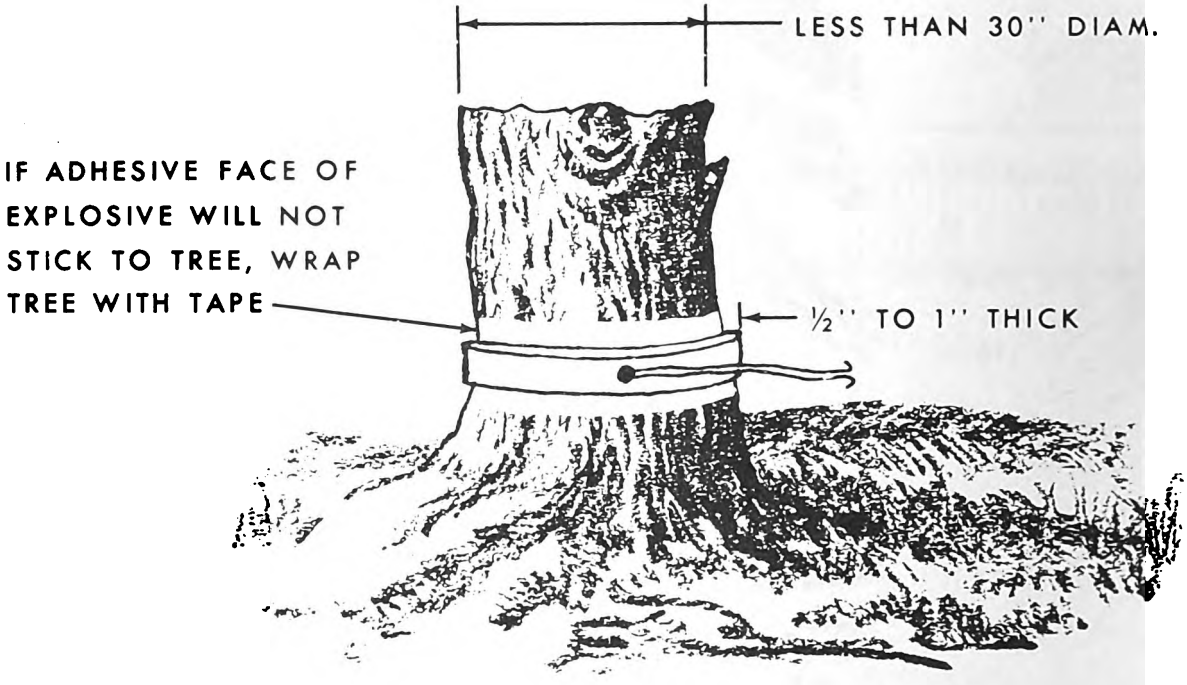

Figure 3. Timber cutting ring charge.

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PERFORMANCE MEASURES (cont)

c. To create a hasty road crater, place the charges in bore holes across the roadway. The holes must be at least 5 feet deep and 5 feet apart (fig 4). Load the bore holes with 10 pounds of explosives per foot of depth.

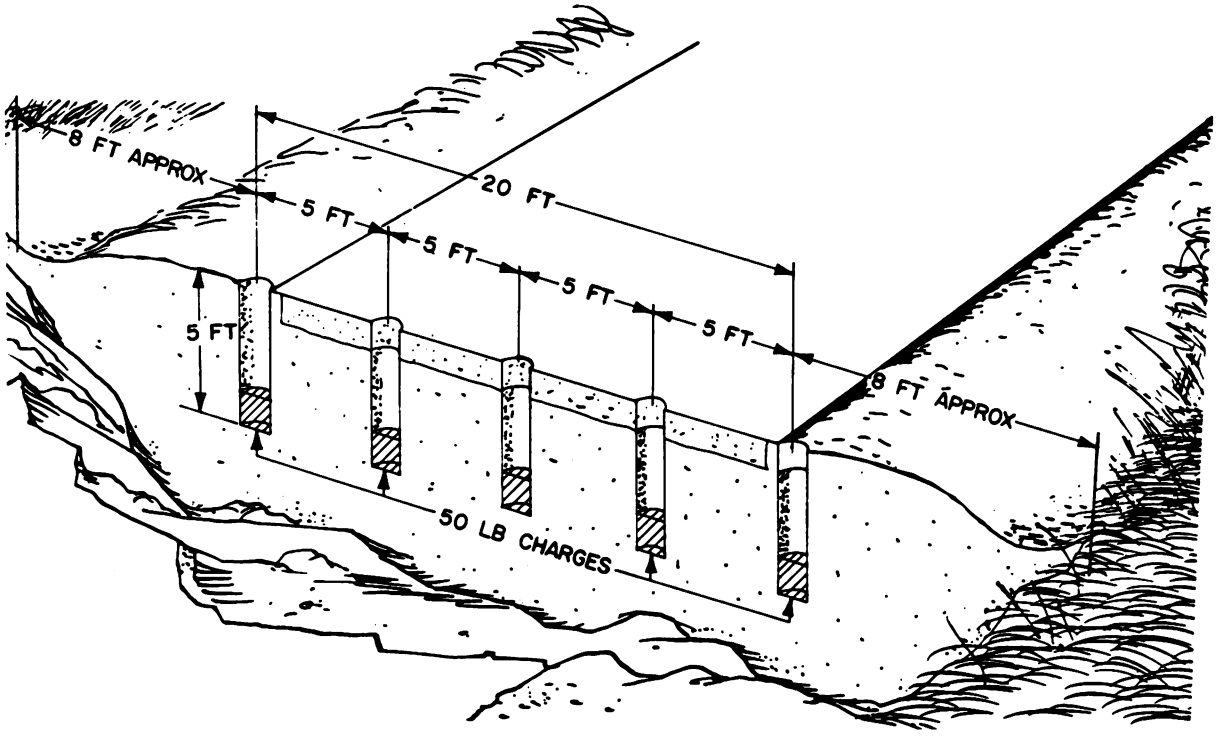

Figure 4. Charge placement for hasty road crater.

d. Bridges.

(1) To destroy a bridge, place the charges so that all supporting parts of the bridge are destroyed simultaneously.

(2) Choose a location halfway between the bridge abutments or intermediate support piers (figs 5 and 6).

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PERFORMANCE MEASURES (cont)

2. Attach the demolition charge to the object.

   Note. Your section leader will tell you how much explosive to use.

   a. Place the charge tight against the object. There should be no airspaces. Composition C4 can be molded and bent to conform to the shape of the object.

   b. Secure the charge to the object. Use string, rope, tape, or anything else available (figs 1, 3, and 6).

   c. Place a cratering charge in the holes you prepared. Pack dirt, rocks, or gravel back in the hole (attach the detonating system to the charge before you pack the hole with dirt).

3. Assemble a non-electric/electric detonating system (see Task Summary 051-193-1504).

4. Move to a safe distance (see GTA 5-10-28).

5. Detonate the demolition charge.

REFERENCES

FM 5-25, Explosives and Demolitions, chaps 3 and 4, pp 3-1 thru 4-63.
GTA 5-10-28, Demoliton Card.

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DRIVE A TRACK VEHICLE USING TERRAIN FOR COVER AND CONCEALMENT (M113A1)

CONDITIONS

As a driver of a track vehicle in a field environment or tactical situation, given a track vehicle, knowledge of the enemy situation, and a mission to drive from one point to another.

STANDARDS

Drive the vehicle over the route selected by the vehicle commander or section leader, in accordance with the considerations in the performance measures.

PERFORMANCE MEASURES

1. The vehicle commander should give you clear, specific instructions as to the route which affords the best use of available cover and concealment (fig 1).

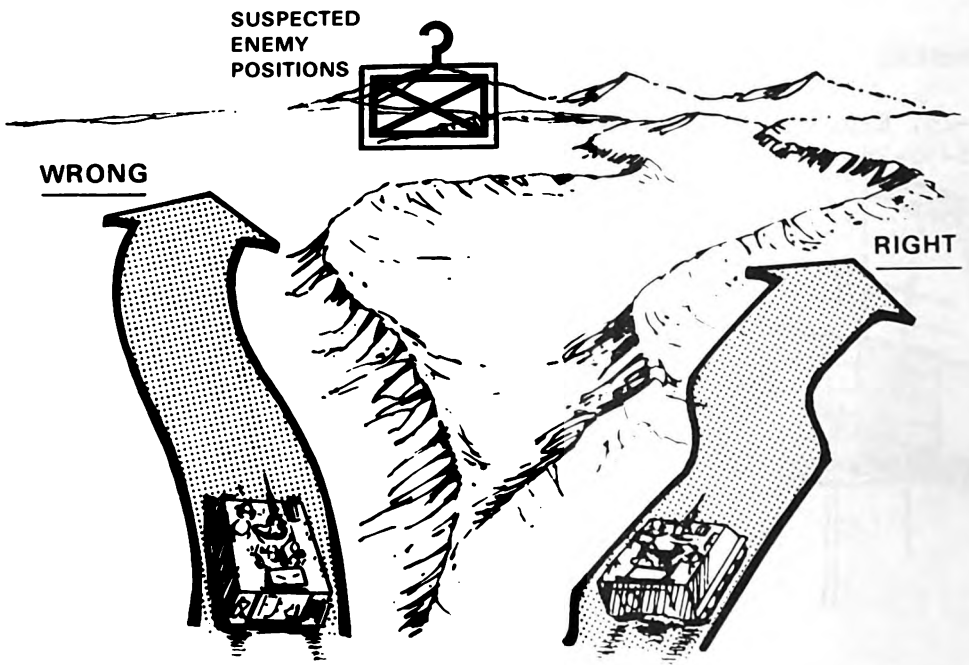

Figure 1.

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PERFORMANCE MEASURES (cont)

2. Follow these terrain driving rules to reduce exposure to effective enemy fire and detection:

   a. Never skyline or move directly forward from a hull-down position (fig 2).

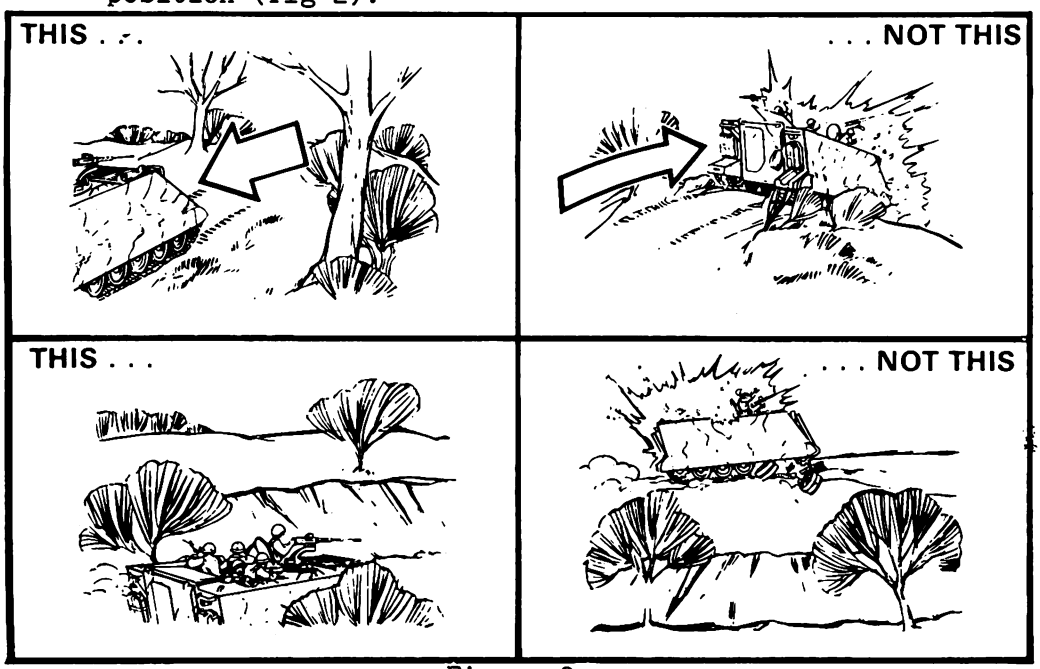

Figure 2.

   b. Avoid dusty terrain when possible, since it will give away the movement of armored vehicles (fig 3).

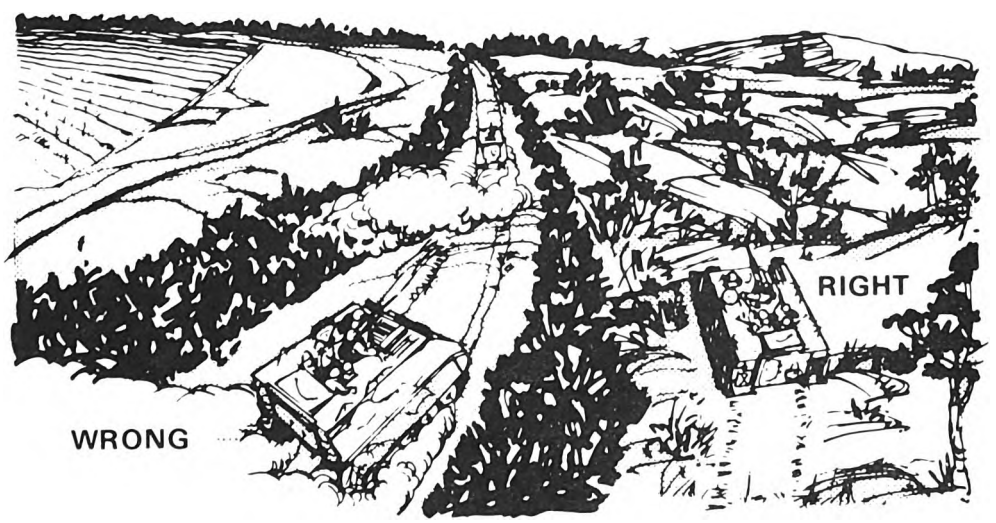

Figure 3.

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PERFORMANCE MEASURES (cont)

c. Use all available cover and concealment.

d. Try to leave the terrain looking as natural as possible to make tracking by the enemy harder.

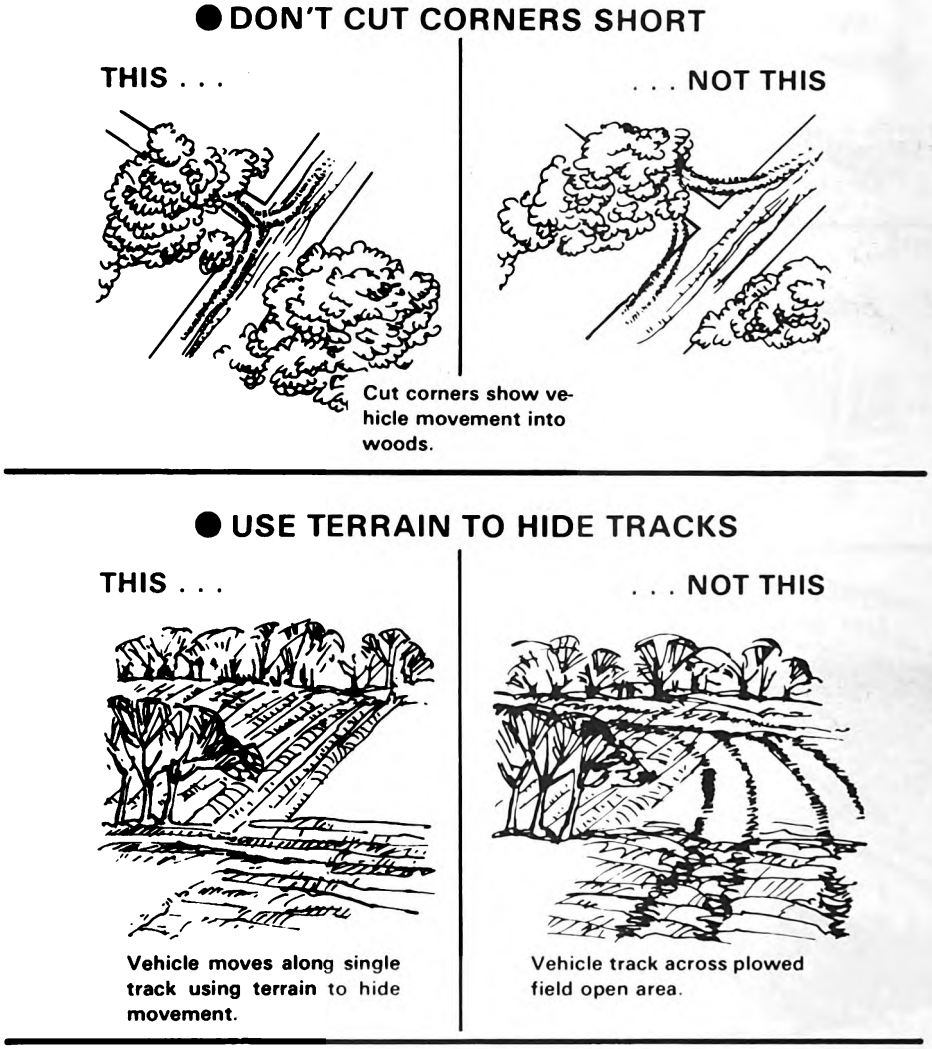
● DON'T CUT CORNERS SHORT
THIS . . .
. . . NOT THIS
Cut corners show vehicle movement into woods.
● USE TERRAIN TO HIDE TRACKS
THIS . . .
. . . NOT THIS
Vehicle moves along single track using terrain to hide movement.
Vehicle track across plowed field open area.

Figure 4.

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PERFORMANCE MEASURES (cont)

e. If you must cross an open area, check it first, then cross it quickly. When you must cross an open area (emerge from a woodline, cross a ridge, etc.), carefully check out the area for possible enemy positions before you emerge from cover (fig 5). If enemy locations are identified or suspected, suppress or smoke them prior to crossing. Cross the open area as rapidly as possible from covered position to covered position. (If you are exposed for less than 30 seconds, it will be extremely difficult for an enemy ATGM gunner to acquire, fire, track, and hit you at long range.)

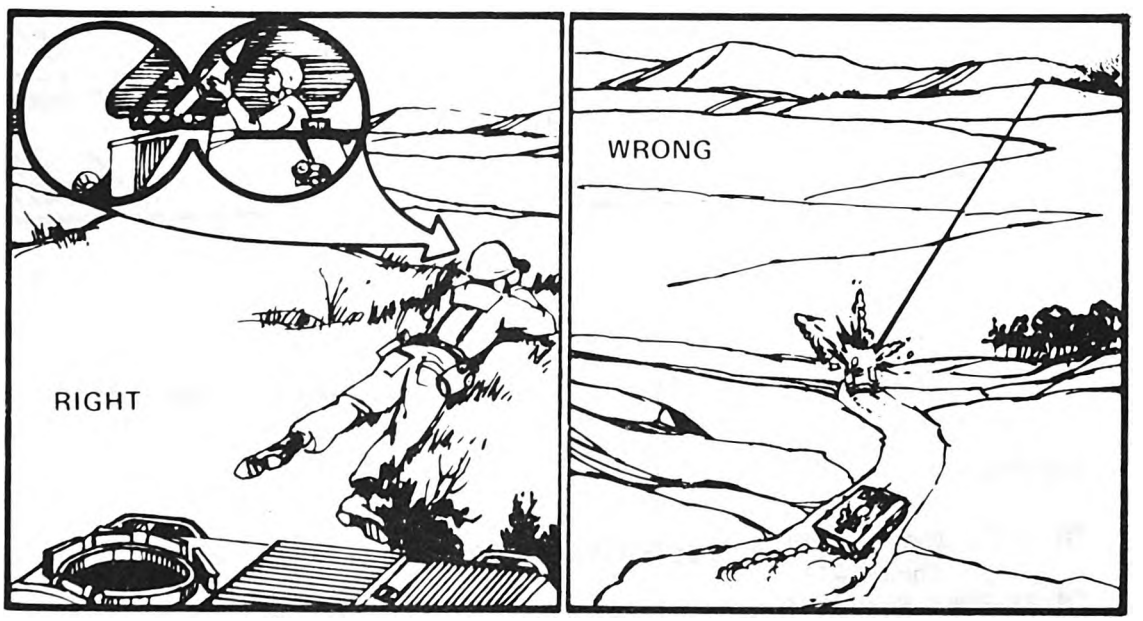

Figure 5.

f. Make every effort to prevent exposing the sides or rear of your vehicle to suspected enemy gun emplacements or ATGM fire.

g. Stay close to the edge of wooded areas. Overhanging branches will help break up the outline of your vehicle (fig 6). When possible, select a cross country route rather than trail. To conceal your vehicle partially and to break up its outline, drive in the shadows of buildings, trees, or other large objects.

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PERFORMANCE MEASURES (cont)

EXAMPLE:

Here, a dense tree line provides protection from Saggers.

Figure 6.

h. Drive around areas where the vehicle might become mired.

REFERENCES

FM 7-7, The Mechanized Infantry Platoon and Squad, chap 3, pp 3-11 thru 3-14.
TM 21-306, Manual for the Tracked Combat Vehicle Driver, w/C1, para 18 and 19, p 17; para 29, p 34.

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DRIVE AN M113A1 (APC)

CONDITIONS

Given an M113A1 armored personnel carrier (APC) during all weather conditions, a track commander, and a requirement to drive the M113A1 from one point to another.

STANDARDS

1. Drive the M113A1 in accordance with the performance measures.
2. Bypass all obstacles where possible. When they cannot be bypassed, inform the track commander and follow his instructions.

PERFORMANCE MEASURES

WARNING: The carrier should not be started unless the portable and fixed fire extinguishers are present and in operating condition.

1. Driving the carrier.
   a. Make sure the cargo, driver's, and commander's hatches are latched in the open or closed position.
   b. Start the engine (see Task Summary 071-333-6517, Start the Engine of an M113A1).
   c. Make sure the ramp is up and securely locked (see TM 9-2300-257-10, p 2-72).
   d. Make sure the driver's hatch is locked in either the closed or open position (with the positive safety pin).
   e. Set the shift lever to the driving range you want (see Performance Measure 2).

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PERFORMANCE MEASURES (cont)

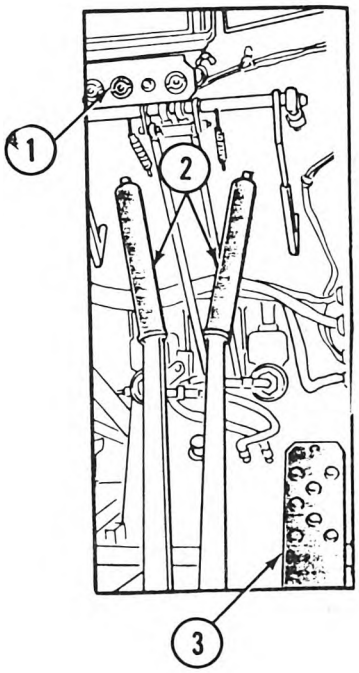

Figure 1.

f. If the tactical situation permits, sound the horn (fig 1, item 1) to warn personnel that you are about to move the carrier.

g. Pull back on the steering levers (fig 1, item 2) so the lock buttons pop up, then let them go forward.

h. Step on the accelerator pedal (fig 1, item 3). Go easy. Take off smoothly. Push on the pedal to control the speed. The transmission will shift automatically within the range you set for it. To hold in a range past the normal shift point for a few seconds, or to shift down for extra power, push the pedal all the way to the floor.

CAUTION: The full-throttle transmission detent (pedal to the floor) is not a trade-off for selecting the proper range. Use the detent for short bursts of power, not as a way to gear down for heavy hauling.

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PERFORMANCE MEASURES (cont)

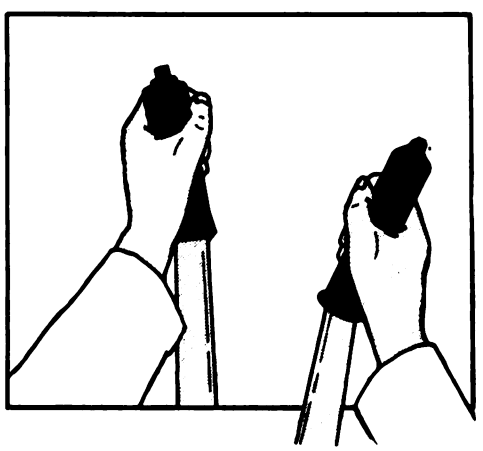
3. Steering and braking.

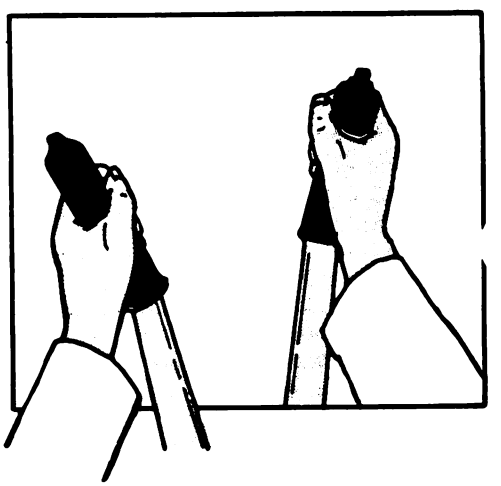
WARNING: Don't press or touch the lock buttons while the carrier is moving. The lock buttons are strictly hands-off except for parking.

a. The steering and braking levers control separate right and left steering brakes in the control differential. By pulling on the levers you can slow or stop either track for steering, or both tracks at once for stopping. A lock button at the top of each lever lets you set and lock the brakes for parking.

b. Going forward or backward, the carrier will always turn toward the track that is moving slower, so:

(1) Pull back on the left-hand steering and braking lever to turn LEFT.





(2) Pull back on the right-hand steering and braking lever to turn RIGHT.

c. The harder you pull, the quicker you turn, so use your head as well as your hand. Just like the brakes in a car, the steering brakes can fade if they get too hot. They can get glazed and lose their grip from too much light use. You need

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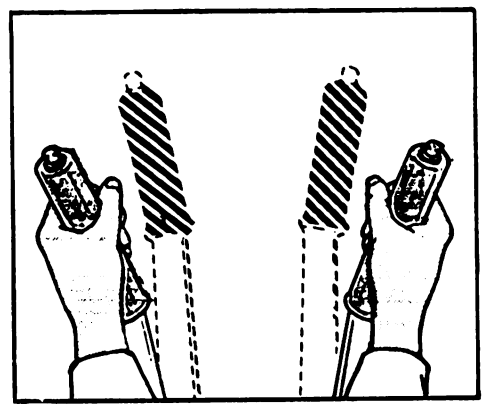
PERFORMANCE MEASURES (cont)

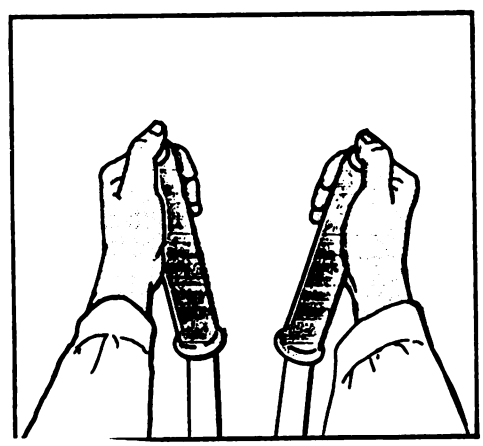
them, so take care of them. Don't just haul back and wait until the carrier is pointed where you want it to go. Pump the levers smoothly, so the brakes work, on and off. The faster you go, the wider the turn, so look and think ahead. Plan where you want the carrier to go, and be sure you have room to move.

d. To stop, pull both levers at once. The same methods that apply to steering apply to stopping. Unless it's an emergency, don't just haul back and hope. Use a pumping movement. Balance the pull so the carrier stops in a straight line, unless you really mean to stop and turn at the same time. Take your foot off the accelerator pedal when you're stopping. You'll often find that you can just coast to a stop without using the brakes at all.



e. To lock the brakes for parking, pull back hard to both levers and press the lock buttons down.

f. To unlock the brakes, pull back on the levers without touching the lock buttons. The buttons will pop up and release the levers.



4. Pivot steering and braking.

CAUTION: Unless it's an emergency, <u>never</u> use the pivot steer brakes when you're going faster than 15 mph, or in a driving range higher than 1-2. Never use the pivot steer brakes and differential brakes at the same time.

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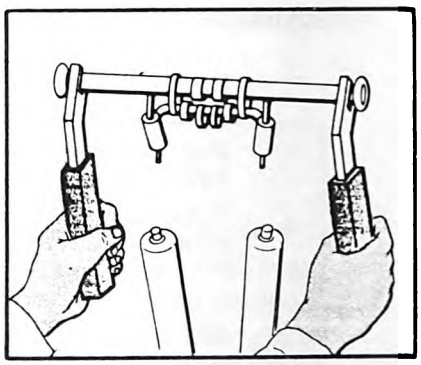
PERFORMANCE MEASURES (cont)



a. The pivot steer brakes work like the differential brakes. They are disk brakes, and when you pull the handle, they lock up.

b. Pull the right handle to pivot right.

c. Pull the left handle to pivot left.

d. Pull both handles to make a sudden stop from a slow speed. You can use the pivot brakes if the differential brakes fail, but if you are moving very fast something could break.

5. To drive an M113A1 during periods of extreme heat, humidity, or salty conditions, the following rules apply:

a. Check the gages and warning lights often while driving.

b. Stop and fix any problem as soon as it occurs or as soon as the tactical situation will allow.

c. Check the radiator, air cleaner, and battery often.

d. When at a halt, keep the vehicle in shelter or shade as much as possible.

e. If shelter is unavailable, cover the vehicle with a tarpaulin, or at least cover the air intake and exhaust grills.

f. Keep the vehicle clean to prevent the growth of fungus.

g. Lubricate frequently.

h. Do not drive in a lower gear than necessary.

i. Keep the radiator clear of dirt, bugs, and build-up.

6. To drive an M113A1 during periods of snow and rain, the following rules apply:

a. Use a low transmission range to move the vehicle without digging in.

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PERFORMANCE MEASURES (cont)

b. Clean mud or snow off the tracks and road wheels as soon as possible after operation.

c. If the vehicle breaks through heavy snow crust, use the 1 range to climb back onto the crust.

d. Use the transmission range that gives the best traction when you must drive in soft or fine snow.

e. Use a transmission range that moves the vehicle steadily and without straining the engine when driving on ice. Drive carefully to avoid skidding.

f. Before operating in heavy mud, deep sand or snow, or heavy underbrush, take off the track shroud.

g. If freezing temperatures are expected, do not park the vehicle where it could become frozen to the ground. If possible, place brush, boards, or any material to hold the track up off the ground.

h. When driving through heavy mud, snow, sand, or underbrush, turn vehicle by making a series of short turns.

i. If driving on a snow or ice covered grade, go as nearly straight up/down the slope as possible.

7. Driving precautions.

a. Use the 1-2 range until you get used to driving the carrier.

b. Take care not to oversteer or go too fast, especially on hard pavement. You could lose control of the carrier.

c. Slow way down when you get to the top of a hill or the edge of a trench or ditch.

d. Use a low range (1 or 1-2) when driving down steep hills, and keep your speed down. When going down a trench or ditch, take care not to let the final drives dig in at the bottom.

e. Just as you get to the bottom of a trench or ditch, gun the engine. This helps lift the final drives away from the bottom.

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PERFORMANCE MEASURES (cont)

f. On loose sand, dirt, or rock, especially on side slopes, steer in several short turns to let the track clear itself of rocks, dirt, branches, and other junk. In heavy sand, mud, snow, or heavy growth, remove and stow the track shrouds.

g. Do not use the engine and transmission to hold the carrier on a slope. If the engine is running the transmission will overheat and if the engine is off, it won't hold. Use the brakes.

h. Except in an emergency, do not use the hand throttle for driving.

i. Before lowering or raising ramp, the rear area will be checked for clearance and the horn sounded twice. Defective ramps will be marked "FREE FALL RAMP" on the ramp and sides of the vehicle.

j. Allow no one to ride on top of the carrier.

k. Protective headgear, TC helmet (CVC), or helmet liner will be worn by all personnel.

l. Driver and TC will wear protective eye gear.

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored M113A1, chap 2, pp 2-66 thru 2-71.

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DRIVE AN APC WITH NIGHT VISION DEVICES, INFRARED EQUIPMENT, AND BLACKOUT DRIVE

CONDITIONS

During darkness, given an M113A1 armored personnel carrier (APC) with operative blackout drive and an M19 infrared periscope, a vehicle commander, and a requirement to drive over varied terrain which consists of slopes, trenches, vertical walls, streams, etc.

STANDARDS

The individual will negotiate the obstacles by:

1. Using blackout drive on command.

2. Installing and using an M19 infrared periscope on command.

PERFORMANCE MEASURES

1. Blackout night driving (fig 1).

   a. Hold the lock lever in the UNLOCK position, turn the main lever to the BO DRIVE position, and then release the lock lever.

   b. The blackout headlight, the blackout marker lights, and the blackout bulbs in each taillight will come on. The blackout stoplight will come on when both steering levers are pulled to brake the carrier.

      (1) The blackout marker can be used at night to maintain proper vehicle intervals. When you are following vehicle at night which is using blackout drive, and you see:

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PERFORMANCE MEASURES (cont)

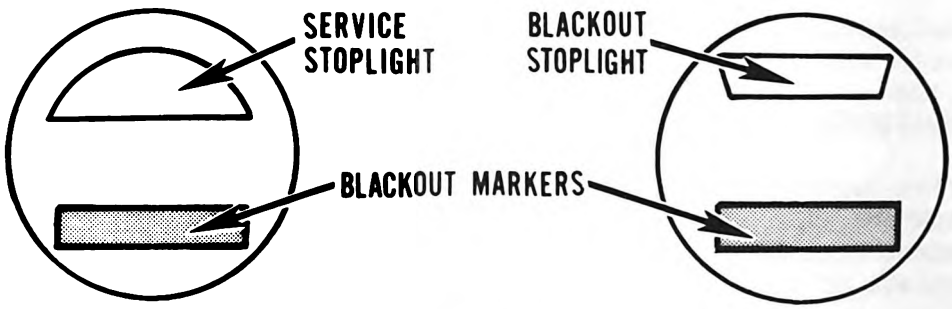

Figure A.

(a) Only one light in both the left and right blackout marker (fig A), you are getting too far behind, and you must speed up to get the proper intervals.

Figure B.

(b) Two lights in each blackout marker (fig B), you are maintaining the proper distance.

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PERFORMANCE MEASURES (cont)

Figure C.

(c) Four light spots (fig C), in each blackout marker, you are too close; slow down.

Figure D.

(d) An additional light slightly above the right blackout marker (fig D), the driver ahead is braking. You must brake or turn your vehicle to avoid overrunning him.

(2) If you are alone or the lead vehicle in a column using blackout drive, remember that the blackout drive light provides a diffused white light that is effective only up to 15 meters to the front of your vehicle. DRIVE CAREFULLY!

2. Operating the M19 infrared periscope (fig 2 thru 5).

When required for blackout driving, the M19 infrared periscope is installed in the driver's hatch and operated as shown in figures 3, 4, and 5.

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PERFORMANCE MEASURES (cont)

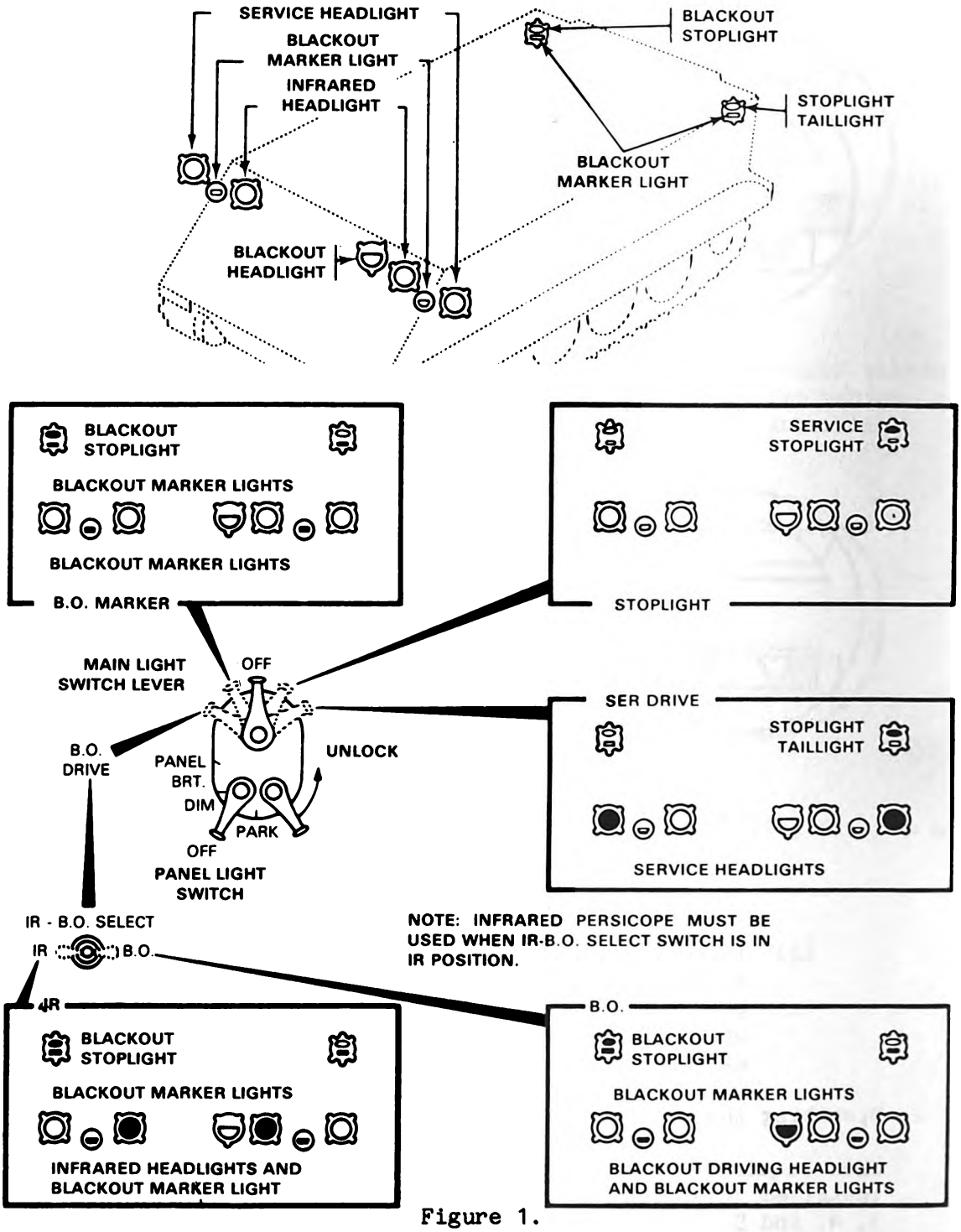

Figure 1.

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PERFORMANCE MEASURES (cont)

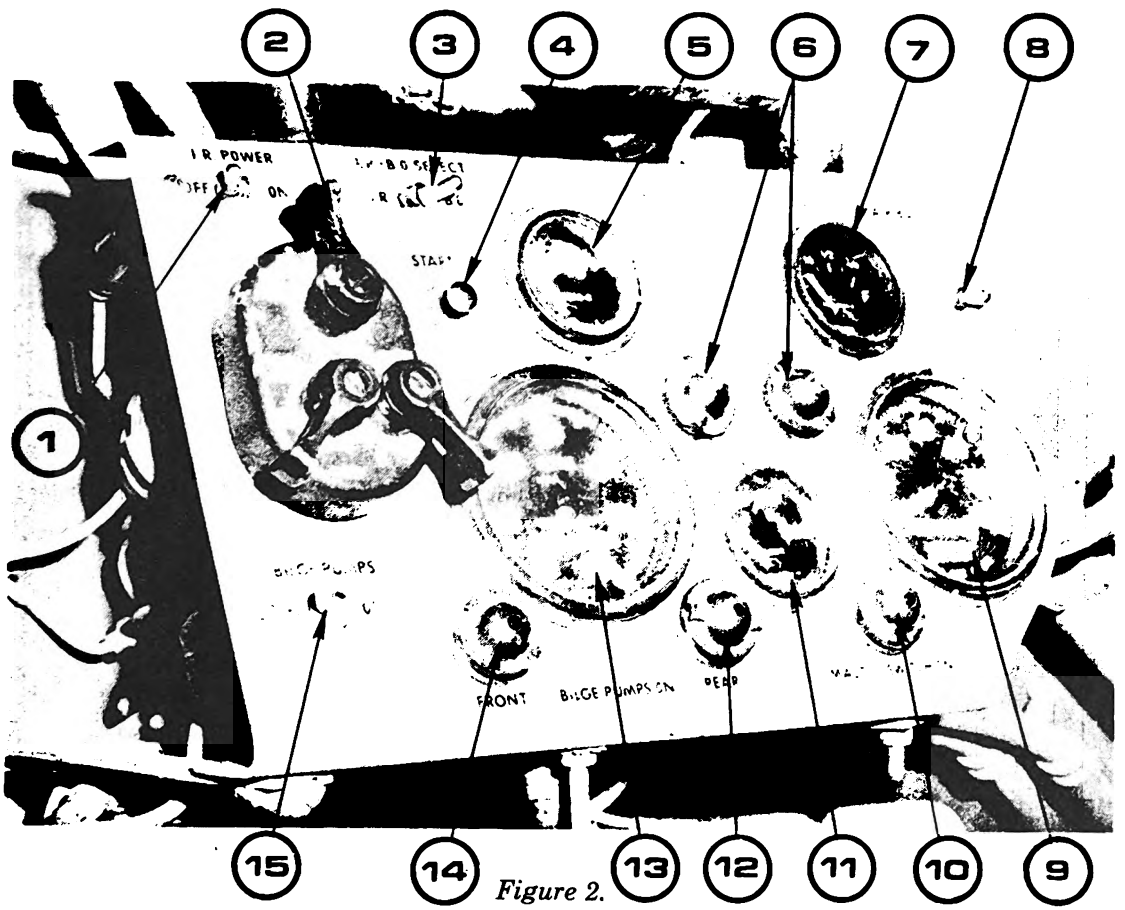

Figure 2.

1—I.R. POWER SWITCH
2—LIGHTS SWITCH ASSEMBLY
3—I.R-B.O. SELECT SWITCH
4—START SWITCH
5—BATTERY GENERATOR INDICATOR
6—PANEL LIGHTS
7—FUEL INDICATOR
8—AIR BOX HEATER SWITCH
9—SPEEDOMETER
10—MASTER SWITCH ON INDICATOR LIGHT
11—ENGINE TEMPERATURE INDICATOR
12—REAR BILGE PUMP ON INDICATOR LIGHT
13—TACHOMETER
14—FRONT-BILGE-PUMP-ON INDICATOR LIGHT
15—BILGE PUMPS SWITCH

Figure 2.

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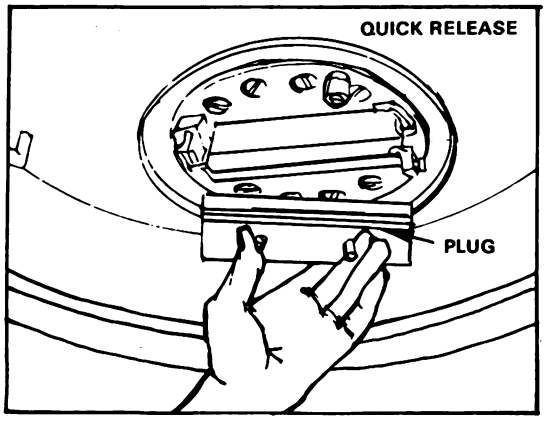
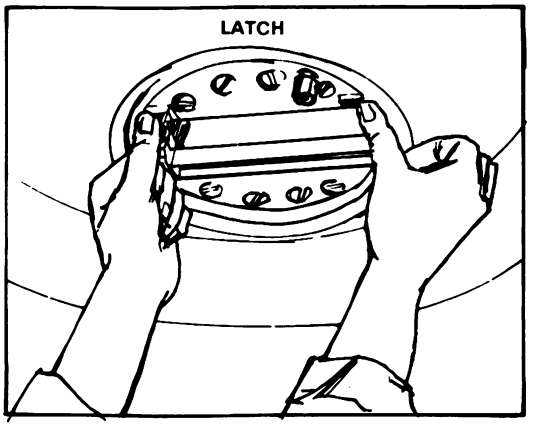
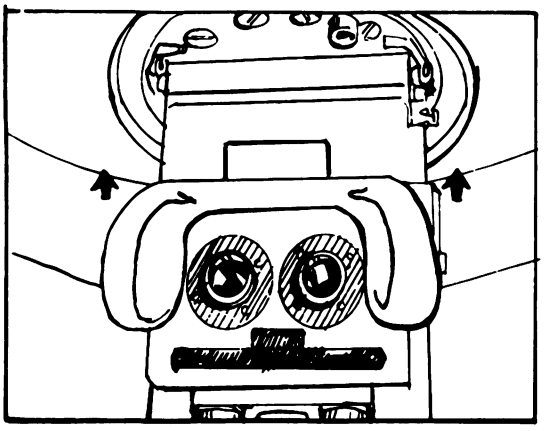
PERFORMANCE MEASURES (cont)



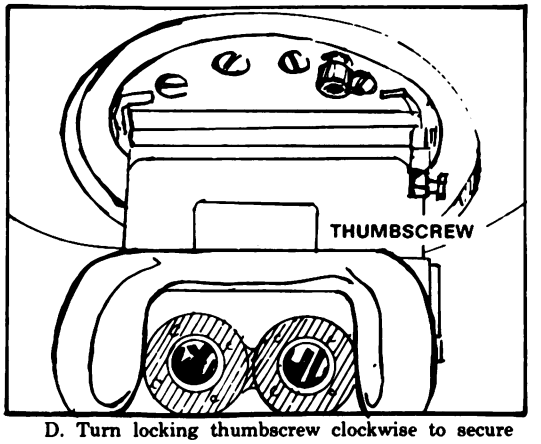
A. Remove plug from quick release.



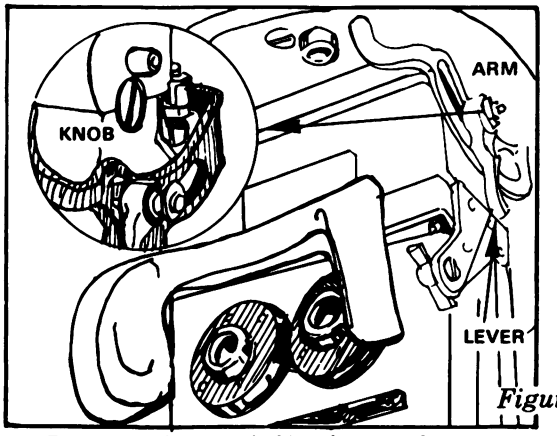
B. Push both periscope latches forward.



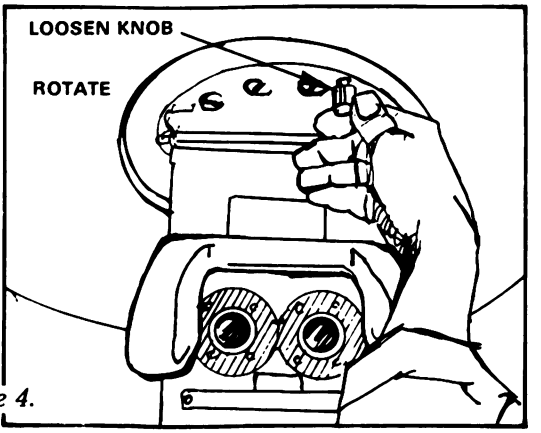
C. Carefully insert periscope and push upward.



D. Turn locking thumbscrew clockwise to secure periscope in quick release.



E. Loosen elevation locking lever, and set arm adjusting knob so both ends of elevation arm contact quick release.



F. Loosen azimuth locking knob, and rotate periscope to check operation.

Figure 4.

Figure 4.

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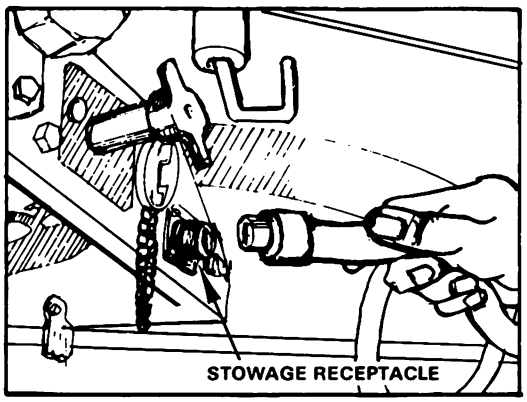
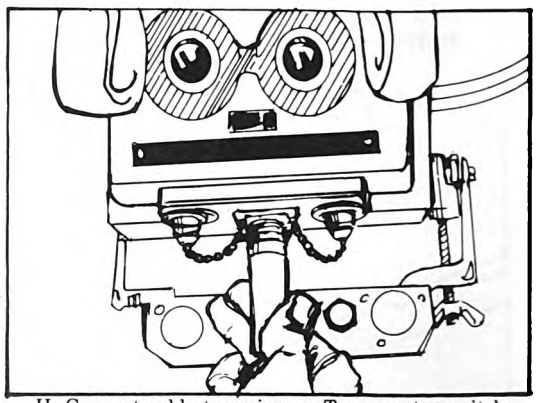
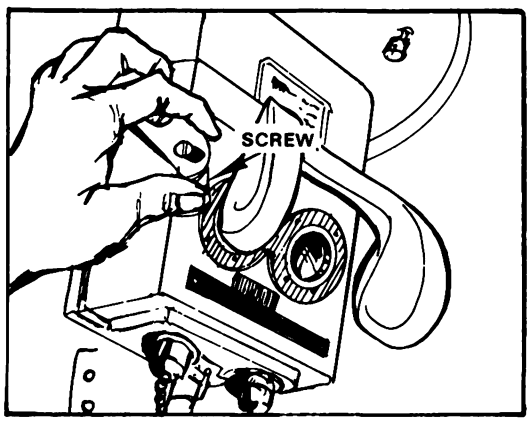
PERFORMANCE MEASURES (cont)



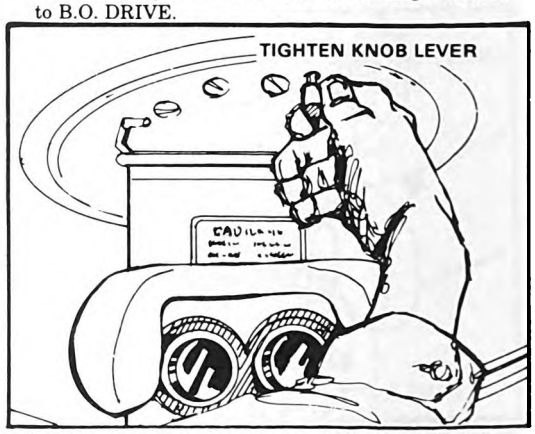
G. Remove periscope power cable from stowed position.



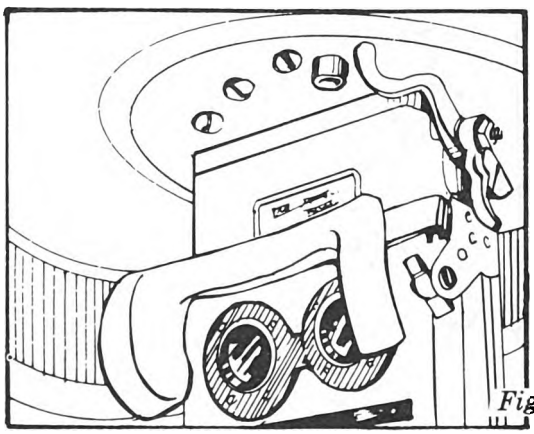
H. Connect cable to periscope. Turn master switch ON, infrared power switch ON, and main light switch to B.O. DRIVE.



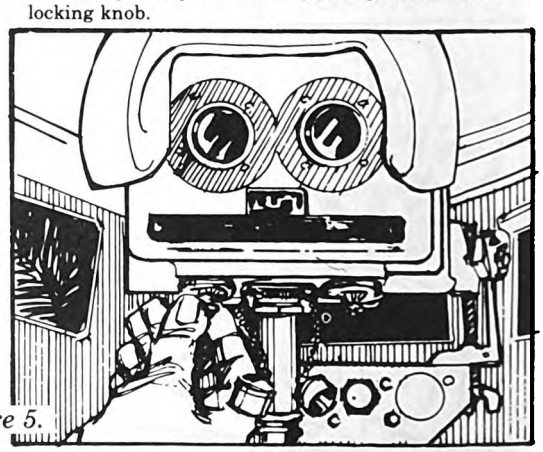
I. Loosen clamping screw, and adjust headrest.



J. Adjust periscope in azimuth, and tighten azimuth locking knob.



K. Adjust periscope in elevation, and tighten locking lever.



L. Focus each eyepiece with adjusting screw.

Figure 5.

Figure 5.

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PERFORMANCE MEASURES (cont)

WARNING: The infrared powerpack must be completely deenergized before the power cable is disconnected. The power cable must be installed in the periscope, not stowed before power is turned on. Failure to turn both the main light switch lever and infrared powerpack switch (fig 3) to OFF positions before disconnecting the cable will result in arcing, which may cause injury to personnel and damage to equipment. Before disconnecting the cable from periscope after use, wait 1 minute until residual charge in the system has drained off and then immediately move the cable from the periscope to the stowage plug on the master switch panel and secure receptacle down. Do not, under any circumstances, touch the end of the cable when moving from one plug to another because the voltage of power pack exceeds 16,000 volts.

Notes. 1. When driving with infrared light remember:

a. You can only see where the light is shinning.

b. You loose depth perception.

EXAMPLE: A canyon may look like a narrow ditch, or a tree may look far away just before you hit it.

2. Always remember to protect your night vision from bright light:

a. If a flare goes off, close one eye and shield the other as much as possible.

b. If possible, before driving at night, spend a half hour in the darkened area allowing your eyes to adjust to the dark.

REFERENCES

TM 9-2300-257-10, Operator's Manual for Carrier, Personnel, Full Tracked, Armored M113A1, chap 2, sec I, pp 2-7 thru 2-10.
TM 21-306, Manual for the Tracked Combat Vehicle Driver, para 22, pp 25 and 26.

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OPERATE AN APC IN WATER

CONDITIONS

In daylight, at a field location, given an operational M113 armored personnel carrier (APC), TM 9-2300-257-10; safety equipment as prescribed by TM 9-2300-257-10, and the local SOP/regulation.

STANDARDS

1. Prepare and drive the M113 across the water obstacle.

2. The M113 must negotiate the water obstacle safely and without stalling, and reach the opposite bank in an operable condition.

PERFORMANCE MEASURES

1. Before entering water:

   a. Check the hull drain plugs, pipe plugs, and access plates.
   b. Make sure the track shrouds are properly installed and in good condition.
   c. Check the bilge pump operation.
   d. Make sure the power plant door is secure.
   e. Make sure the ramp door is secure.
   f. Extend and lock the trim vane.
   g. Make sure periscopes are installed.
   h. Make sure the load is evenly distributed.
   i. Turn on the interior lights if the tactical situation permits.
   j. Close the hatch covers except the driver's hatch.

2. Enter the water.

   a. Turn on the bilge pump.
   b. Select a firm, gradual slope free of obstacles.
   c. Enter the water using the 1 range.
   d. Open the top hatch covers after the carrier is in the water.
   e. If the carrier shows signs of flooding or swamping, accelerate and head for shore.

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PERFORMANCE MEASURES (cont)

WARNING: Do not enter water with choppy waves that could flood the carrier. If waves are more than a foot high, it is not safe to swim the carrier. Never try to tow another vehicle in the water.

3. Drive in the water.

   a. Shift to the 1-2 range.
   b. Steer the carrier using the pivot steer levers or steering and braking levers. Release the levers before the turn is complete and let momentum finish the turn.
   c. Cross slow-flowing waters (streams, rivers, bodies of water with current less than 2 mph) diagonally, pointing the vehicle upcurrent from the intended exit point.

   WARNING: Check the trim and freeboard after entering the water. Shift cargo and personnel if necessary to obtain good trim and 7.5 inches minimum freeboard at the right front corner of the carrier.

4. Stop in the water.

   a. Release the accelerator pedal slowly while pulling back gently on the steer levers to stop the tracks.
   b. Release the levers; shift to reverse.
   c. Depress the accelerator.
   d. When the carrier stops moving forward, release the accelerator and shift to neutral.

5. Leave the water.

   a. Select an exit point with a firm, clear surface and gradual slope.
   b. Approach the shore so that both tracks strike land at the same time.
   c. Release the accelerator before striking ground.
   d. Shift to the 1 range when the tracks strike ground.
   e. Use the pivot steer levers and the 1 range until the carrier is out of the water.
   f. Open the hatch covers (if closed) and retract the trim vane.
   g. When the bilge is clear of water, stop the bilge pumps.
   h. Perform after operation maintenance (see Task Summary 071-333-6522, Perform After-Operation Daily Preventative Maintenance Checks and Services on an M113A1).

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REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored, M113A1, chap 2, pp 2-91 thru 2-98.

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NEGOTIATE OBSTACLES IN AN M113A1

CONDITIONS

Given an M113A1 personnel carrier, a track commander, and a requirement to drive across various obstacles.

STANDARDS

1. Drive the vehicle across any of the obstacles below in accordance with the performance measures.

   a. Over a trench 1.67m (5-1/2 ft) wide.
   b. Over a vertical wall 0.7m (2 ft) high.
   c. Up a 60% grade.

2. Approach all obstacles at a speed no greater than 5 mph.

3. Approach all obstacles straight on.

PERFORMANCE MEASURES

1. Follow all instructions given by the vehicle commander.

2. To cross a trench or ditch 5-1/2 ft wide or less (table 1).

   a. Ease up to the ditch.
   b. Place the gear selector into the 1 range.
   c. Enter the ditch slowly.
   d. Keep up enough power to carry the vehicle to the far bank.
   e. Accelerate to climb out.
   f. Release the accelerator or the vehicle will pitch forward.
   g. Move out normally.

3. To climb a vertical wall 2 feet high or less.

   a. Ease up to the wall.
   b. Place the gear selector into the 1 range.
   c. Accelerate to climb the wall.
   d. Accelerate until the vehicle starts a downward motion.
   e. Allow the vehicle to lower itself until the tracks touch the ground.
   f. Accelerate vehicle and move out.

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PERFORMANCE MEASURES (cont)

4. To climb a steep grade 60% or less.

   a. Place the transmission in the desired range (see Task Summary 071-333-6500, Drive an M113A1 (APC)).
   b. Pick the straightest route possible.
   c. Do not steer any more than necessary.

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored, M113A1, chap 2, pp 2-66 and 2-67.
TM 21-306, Manual for the Tracked Combat Vehicle Driver, C1, sec IV, p 26, para 23b and c.

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PREPARE AN M113A1 FOR TOWING

CONDITION

Given an inoperable M113A1, a crew may or may not be available, BII, an extra tow cable, (if a similar vehicle is not used), a tow bar, (if the vehicle is to be towed with a tow bar), a towing vehicle with a driver, and a requirement to prepare the inoperable M113A1 for towing.

STANDARDS

Connect the inoperable M113A1 to the towing vehicle in accordance with either method in the performance measures.

PERFORMANCE MEASURES

1. Preparation for towing using a tow bar.

   Note. A tow bar is the safest method of towing an M113A1 track and should be used if available.

   WARNING: Always use a tow bar when the universal joints are disconnected. The carrier has no steering or braking control with universal joints disconnected, and towing with cables may wreck two vehicles.

   a. Secure the tow bar to the towing eyes of the towed vehicle (fig 1).

   b. Connect the tow bar to the pintle of the towing vehicle.

      (1) Position the towing vehicle so its towing pintle lines up with the pintle eye on the tow bar attached to the M113A1 you want to tow (fig 1).

      (2) Take out the locking pin, pull up on the pintle latch, and open the pintle. Hook the drawbar or towbar eye on the pintle, pull on the latch, and close the pintle.

      (3) Make sure the latch locks the pintle closed, then put in the locking pin to secure the latch.

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PERFORMANCE MEASURES (cont)

c. If the towed equipment has an electrical connector, plug the connector into the carrier's trailer light receptacle. The trailer's taillight and stoplight will work with the carrier's.

d. Place the towed vehicle's transmission shift lever in N (neutral).

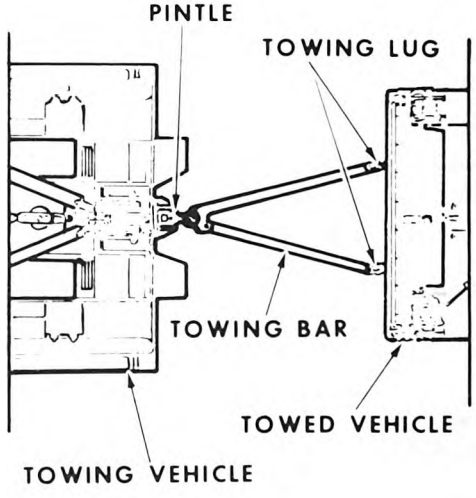

Figure 1.

WARNING: If the carrier is towed less than 30 miles and at a speed less than 10 miles per hour, it is not necessary to disconnect any universal joints. If the carrier is to be towed more than 30 miles at a speed greater than 10 miles per hour, the universal joints between the differential and final drives must be disconnected. Failure to do so will damage the transmission and differential through overheating and lack of lubrication.

2. Preparation for towing using tow cables.

WARNING: Do not use tow cables when the differential of the disabled carrier is disconnected. The disabled carrier has no steering or braking control.

a. Position the vehicles as shown in figure 2.

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PERFORMANCE MEASURES (cont)

b. Cross the two cables in an X between the front towing eyes of your carrier and the rear towing eyes of the tow vehicle.

c. Connect the tow cables to the shackles.

d. Secure the shackles to the vehicle towing eyes (fig 2) with the headed pin and secure the headed pin with the retaining pin. (If your vehicle has tow hooks instead of shackles, attach the tow hooks to the vehicle then attach the tow cables.)

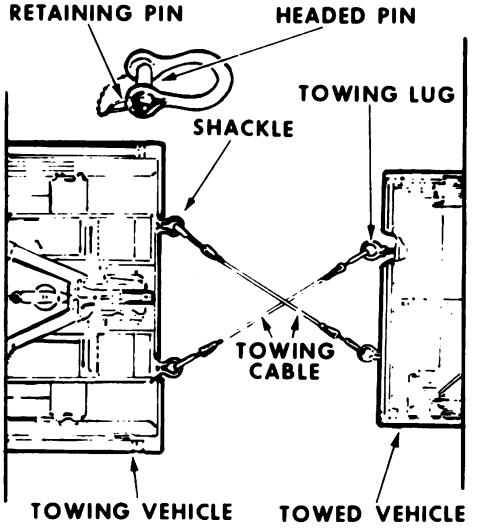

Figure 2.

e. Place the towed vehicle's transmission shift lever in N (neutral).

CAUTION: If you're going to tow the carrier more than 30 miles, or faster than 10 mph, you MUST disconnect the universal joints between the final drives and differential. When the engine is not running there is no cooling or lubrication for the transmission or differential. They will be damaged if you tow the carrier too fast or too far without disconnecting the universal joints.

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REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored M113A1, chap 2, sec III, pp 2-76 thru 2-79.

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REMOVE/INSTALL TRACK SHOE(S) ON AN M113A1

CONDITIONS

Given an M113A1 with crew, BII, ruler, a track wear gage (NSN 5120-01-041-9920), and corrosion preventive compound.

STANDARDS

1. Detect and replace all unserviceable track shoes.
2. All unserviceable track shoes must be replaced so that a minimum of 1/8 inch of track pin extends through both track pin nuts.
3. Adjust the track tension so that when the track wear gage is placed on top of the second roadwheel, the bottom of the track touches the top of the gage and rests on the third roadwheel.

PERFORMANCE MEASURES

1. Removing the track shrouds (fig 1).

   Note. It may not always be necessary to remove the shroud to replace a track shoe.

   a. Position the track connecting fixture between the rear shroud cover (fig 1, item 3) and the rear fender. Tighten the fixture to relieve pressure on the four capscrews (fig 1, item 1) securing the rear cover to the fender.

   b. Remove the four capscrews and washers (fig 1, item 1) securing the rear cover (fig 1, item 3) to the fender.

   c. Remove the track fixture.

   d. Remove the four capscrews and washers (fig 1, item 1) securing the front cover (fig 1, item 5) to the hull.

   e. Remove the eight capscrews and washers (fig 1, item 1) securing the front cover (fig 1, item 5) to the hull.

   f. Remove the two retainer clamps (fig 1, item 2) and the shroud (fig 1, item 4) from the carrier.

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PERFORMANCE MEASURES (cont)

g. Repeat performance measures 1a thru 1f to remove the opposite shroud.

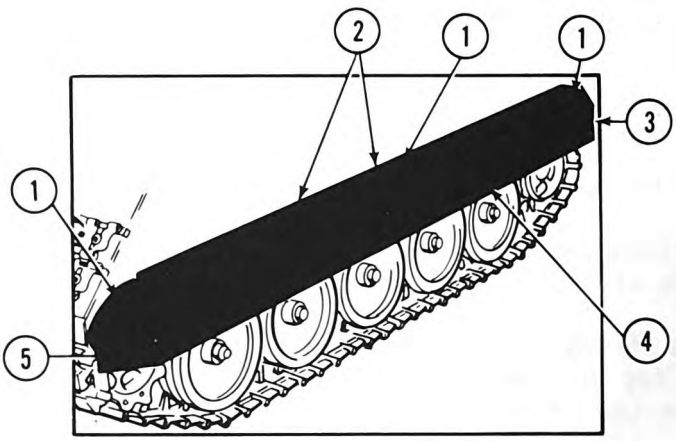

Figure 1. Track shroud, installed view.

2. Inspection of track. Your carrier may have either T130 or T130E1 tracks, or a mixture of both (track shoes are not to be mixed on either side). You need to be able to tell what kind of track shoes you have in order to check track bushing wear. The surest way to tell is to measure the length of the track shoe pad front-to-back at the middle of the pad, or measure the pad hole in the track shoe forging, if the pads are off your track. A T130E1 pad is about 4-3/4 inches long, a T130 pad is about 5-1/4 inches long. A canteen cup measures 5-3/8 inches across the top, so it makes a good gage.

3. Check each track shoe for bushing and grouser wear.

a. Check bushing wear. With the track on the carrier and under normal tension, insert pins of gage 5120-01-041-9920 into the shoes. If the pins freely enter both shoes, track bushings are OK; if the pins do not freely enter both shoes, bushings are worn (fig 2). Report any worn bushings to organizational maintenance.

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PERFORMANCE MEASURES (cont)

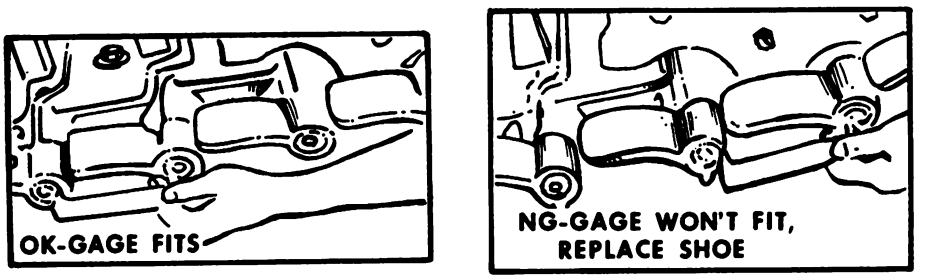

Figure 2. Measuring track shoe bushing wear.

b. Check grouser wear. Measure the height of the top edge of the grouser above the bushing housing. If the shoe has less than 1/4 inch of grouser height left, it's no good (fig 3).

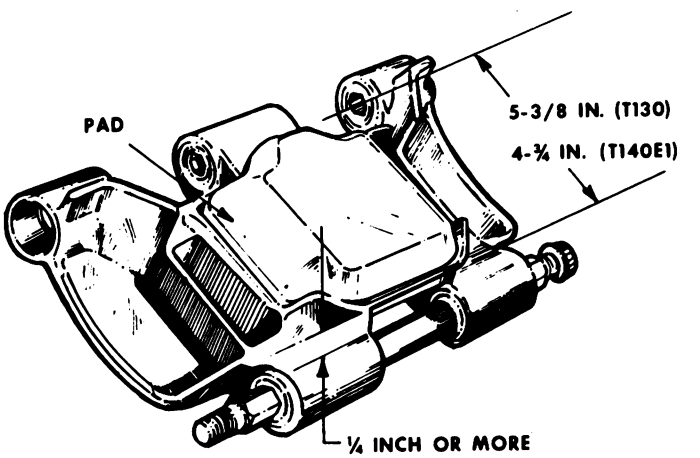

Figure 3. Measuring track shoe grouser wear.

3. Replace unserviceable track shoes by disconnecting the track using the following steps:

a. Drive the carrier onto smooth, level ground and stop so the track shoe you want to take out is about halfway between the sprocket and the first roadwheel, or about halfway between the idler wheel and the fifth roadwheel.

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PERFORMANCE MEASURES (cont)

b. Block the track opposite the one you're going to disconnect so the carrier won't move. Don't set the brakes.

c. Bleed grease from the track adjuster to loosen track tension (fig 4).

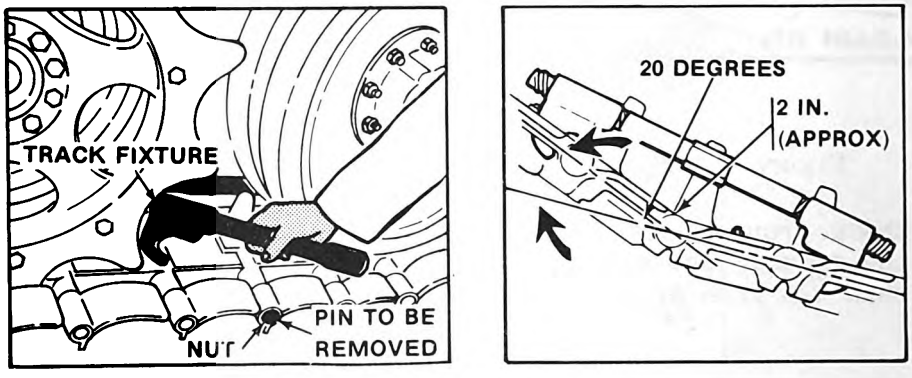

Figure 4. Loosening tension.

WARNING: When a track fixture is used on T130E1 track it might slip, so be careful.

d. Install the two track fixtures across the pin you're going to take out. Tighten the fixtures to get about a 20° angle between the shoes you're going to disconnect (there should be about 2 inches between the fixtures and the track at the pin) (fig 5).

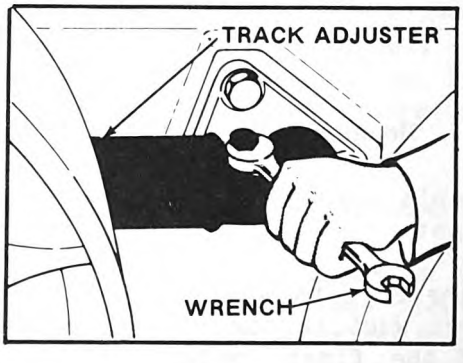

Figure 5. Installing track fixture.

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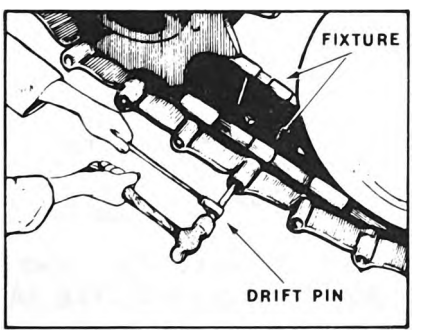
PERFORMANCE MEASURES (cont)

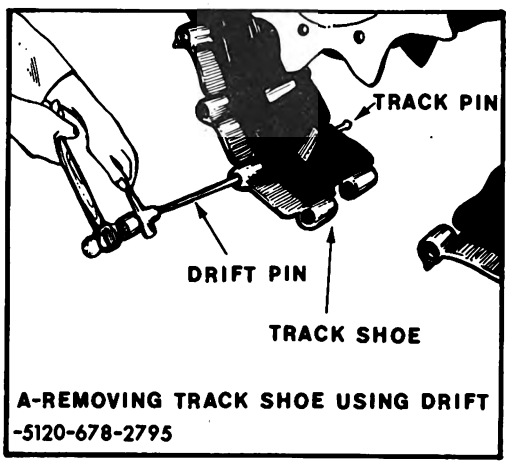
e. Remove the nut from the outer end of the pin you're going to take out, and drive the pin out of the bushings with the drift pin.

f. Remove the track fixtures.

g. Remove the nut from the other end of the shoe you're removing and drive the pin out of the bushings with the drift pin (fig 6).



C-REMOVING TRACK PIN USING DRIFT PIN-5120-678-2795



A-REMOVING TRACK SHOE USING DRIFT -5120-678-2795

Figure 6. Removing track shoe.

h. Remove an unserviceable track shoe from the disconnected track by removing the track pin and then the track shoe.

4. Install a serviceable track shoe.

a. Remove the serviceable track shoe from the stowed position on the carrier, then remove the track pin and two nuts from the track shoe.

b. Coat the track pin with corrosion preventive compound and install a nut on one end, flush with the end of the pin.

c. Position the track shoe on the track, and align the track pin holes with a 20° angle between the shoes. Install the track pin (fig 7).

d. Put a nut on the other end of the track pin and tighten both nuts the same so that about 1/8 inch of pin sticks out beyond each nut, about 2 or 3 threads from each end.

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PERFORMANCE MEASURES (cont)

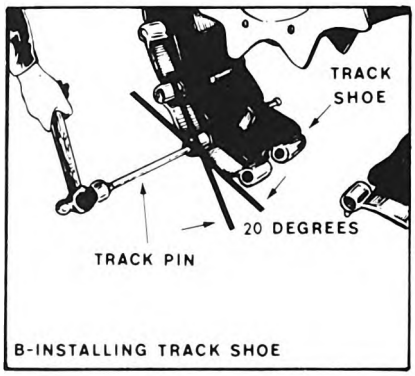
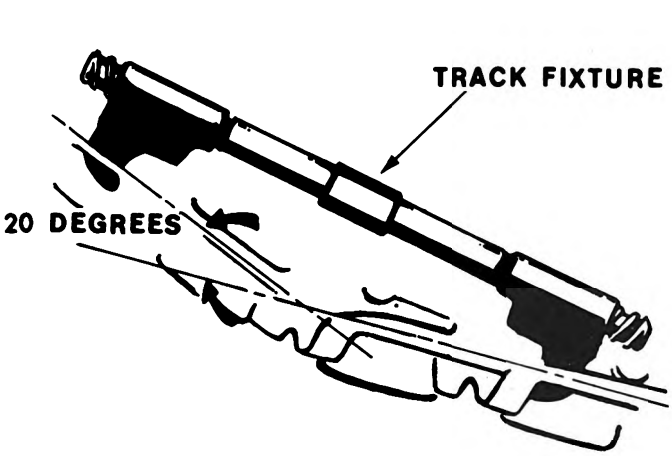


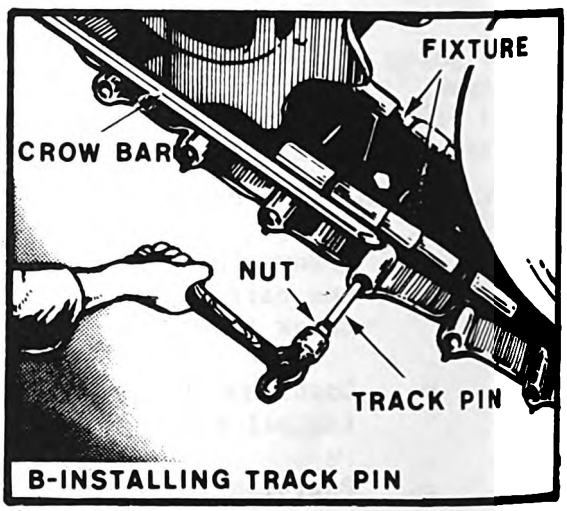
Figure 7. Installing track shoe.

5. Connect the track by using the following steps:

   a. Pull the track ends together and install the two track fixtures across the track shoes to be connected (fig 8A).



A



B

Figure 8. Connecting the track.

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PERFORMANCE MEASURES (cont)

b. Coat the track pin with corrosion preventive compound. Install the track pin nut on one end flush with the end of the pin.

c. Align the track shoe bushing. Tighten the track connecting fixtures to obtain a 20° angle between the track shoes with the track pin holes aligned, and install the track pin (fig 8B).

d. Install the inner track pin nut and tighten both track pin nuts.

e. Loosen and remove the two track connecting fixtures from the track.

f. Adjust track tension (see performance measure 7 and fig 9).

Note. Have organizational maintenance check for proper torque as soon as possible.

6. Install the track shrouds.

a. Install, but do not tighten, the capscrews holding the front cover to the carrier (fig 1, item 5).

b. Position the two retainer clamps (fig 1, items 2 and 4) and install, but do not tighten, the capscrews holding clamps and shrouds to the carrier.

c. Position the track connecting fixture between the rear cover and fender. Tighten the fixture until the holes in the cover align with the threaded holes in the fender. Install the four washers and the capscrews.

d. Remove the track fixture and tighten the 16 capscrews securing the shroud to the carrier.

e. Repeat the same procedures on the opposite shroud.

7. Check track tension and adjust it if needed.

a. Drive the M113A1 on a level surface, allowing the vehicle to coast to a stop without applying the brakes.

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PERFORMANCE MEASURES (cont)

b. Place the wear gage on top of the second roadwheel.

Note. To adjust the track tension, pump GAA into the lubrication fitting on the track adjuster; bleed grease to loosen (fig 9).

c. Adjust track tension until the bottom of the track touches the gage and rests on the third roadwheel (fig 10).

Note. If you extend the track adjuster to its maximum limit of 17 inches and the track is still too loose, remove one track shoe and readjust the track tension.

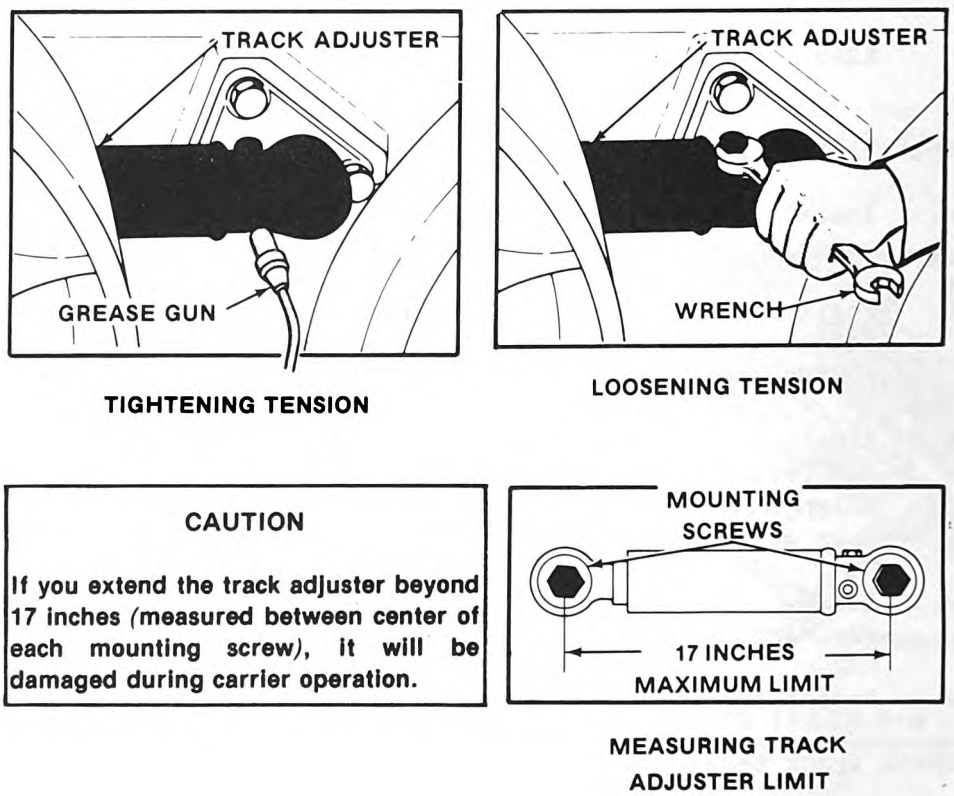
TRACK ADJUSTER
GREASE GUN
TIGHTENING TENSION
TRACK ADJUSTER
WRENCH
LOOSENING TENSION
CAUTION
If you extend the track adjuster beyond 17 inches (measured between center of each mounting screw), it will be damaged during carrier operation.
MOUNTING SCREWS
17 INCHES MAXIMUM LIMIT
MEASURING TRACK ADJUSTER LIMIT

Figure 9. Adjusting track tension.

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STOP THE ENGINE OF AN M113A1

CONDITIONS

Given a moving M113A1 with BII and a crew.

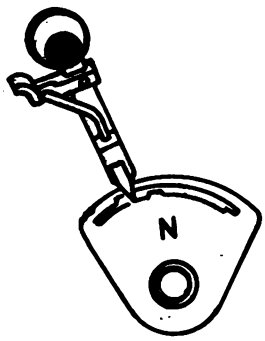
STANDARDS

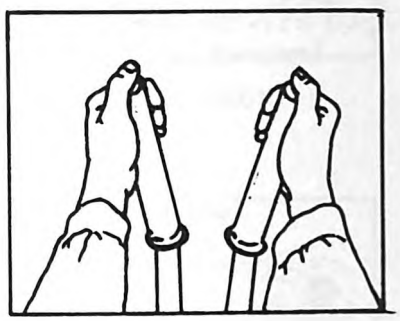
1. Within 5 seconds after a signal or command to stop, bring the vehicle to a complete stop.
2. Stop the vehicle engine in accordance with the performance measures.

PERFORMANCE MEASURES

Stop the engine:

1. Pull back the steering and braking levers and press down the locking buttons to lock the differential brakes.





2. Place the shift lever in N position.
3. Set the engine to run at about 1,000 rpm for 2 minutes or so by adjusting the hand throttle control.

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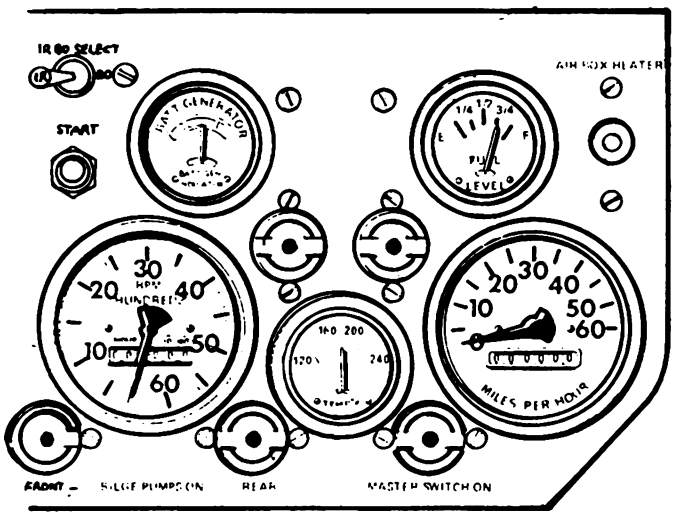
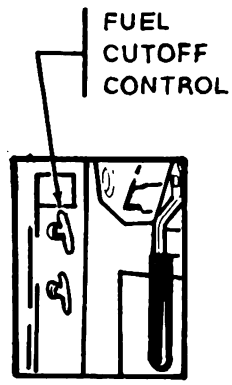
PERFORMANCE MEASURES (cont)

4. Set the engine back to idle (650-700 rpm) and check the instrument panel for normal readings.



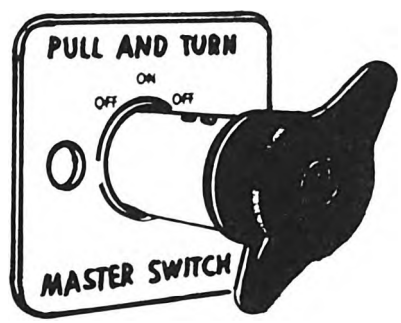


5. Pull the fuel cut-off all the way out. The engine will stop when it has burned all the fuel in its injectors and feed lines. This should only take a few seconds.

   CAUTION: Always shut the engine off before you turn the master switch OFF.

6. Turn off the lights, radio, and any other electrical equipment that is on. If you have a personnel heater kit that has been running, wait for the heater to stop itself after you turn it off.

7. Turn the master switch OFF.



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REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored M113A1, chap 2, sec III, pp 2-88 and 2-89.

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START THE ENGINE OF AN M113A1

CONDITIONS

Given an operable M113A1 with BII, TM 9-2300-257-10, and instructions to start the vehicle during normal or cold weather conditions.

STANDARDS

1. Start the M113A1 during normal weather (above 40°F) without damage to the engine/power train in accordance with performance measure 2.

2. Start the M113A1 during cold weather (below 40° to -25°F) without damage to the engine/power train in accordance with performance measure 3.

PERFORMANCE MEASURES

WARNING: Beware of carbon monoxide gas. Secure engine access panels before starting the engine.

1. Perform before-operation daily preventive maintenance checks and services on an M113A1 (see Task Summary 071-333-6520, Perform Before-Operation Daily Preventive Maintenance Checks and Services on an M113A1).

   Note. If the temperature is below -25°F, you have to follow special procedures to get the engine ready before you start it. See performance measure 3 for those special procedures. Then use the procedure in performance measure 2 to start the engine.

2. To start the M113A1 during normal temperature ranges (above 40°F).

   a. Lock the brakes (fig 1).

   b. Place the shift lever in N (neutral).

   c. Turn off the driving lights switch (fig 2, item 3) and any radios that may be on.

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PERFORMANCE MEASURES (cont)

n. Run the engine for 10 minutes at 800 to 1,000 rpm.

WARNING: Ear protection must be worn when operating the carrier.

o. Continue to check the instrument panel (see warnings above).

CAUTION: Normal idle is 650 to 700 rpm, and normal coolant temperature is 160°F to 230°F. If you let the engine idle too long, the engine could cool below 140°F. Operating the engine at too cool a temperature for very long damages the engine. Run the engine at 1,200 to 1,500 rpm until it reaches 160°F to 230°F.

3. To start the M113A1 during cold weather (below 40° to -25°F).

a. Complete performance measures 2a through 2d above.

b. Remove the driver's access panel next to the driver's seat.

c. Disengage the engine disconnect control handle (fig 4, item 7).

d. Lift the lock on the control handle and push the handle in as far as it will go. This disconnects the engine from the rest of the power plant, so the starter does not have to work so hard.

CAUTION: Never try to move the engine disconnect handle when the engine is running.

CAUTION

Never try to move the engine disconnect handle when the engine is running.

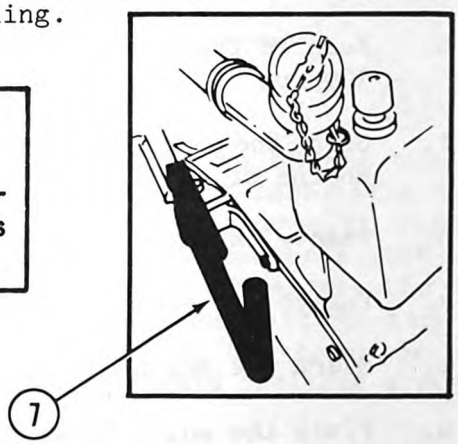

Figure 4. Disengaging the engine's disconnect control handle.

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PERFORMANCE MEASURES (cont)

e. If the carrier has an airbox heater accumulator with gage and manual pump, follow the procedures below. If it has an airbox heater electric air pump, go to performance measure 3f.

(1) Make sure the accumulator gage reads in the yellow (fig 5, item 8).

(2) Add pressure with the hand pump (fig 5, item 9), if required. Don't raise the pressure too high or you may damage equipment.

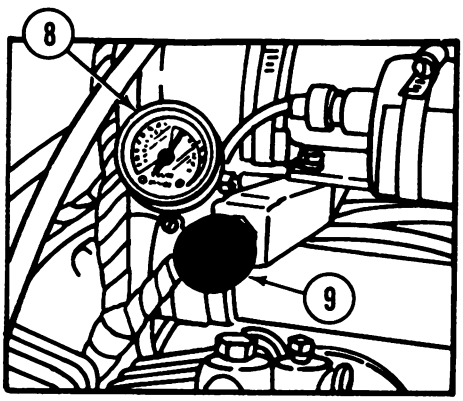

Figure 5. Checking the accumulator gage.

(3) Install the driver's access panel.

(4) Make sure the fuel cut-off control (fig 6) is pulled out.

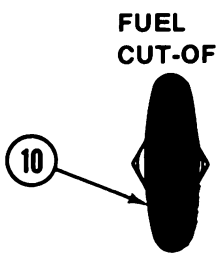

Figure 6. Fuel cut-off switch.

(5) Hold the airbox heater switch (fig 7) at ON for a second or two, then let it return to OFF.

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PERFORMANCE MEASURES (cont)

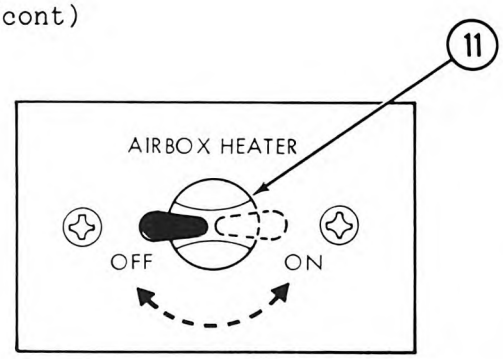

Figure 7. Working the airbox heater.

(6) Press in the start switch and hold it in for about 5 seconds, then release it.

(7) Push in the fuel cut-off control.

(8) Press in and hold the start switch while you turn the airbox heater switch to ON and OFF. Hold the airbox heater switch at ON for about 1 second, then at OFF for about 2 seconds (fig 7).

(a) Hold the start switch and work the airbox heater switch until the engine is running at 300 to 350 rpm, then release the start switch.

(b) Keep working the airbox heater switch until the engine runs smoothly at 650 to 700 rpm.

f. If the carrier has an airbox heater electric air pump:

(1) Install the driver's access panel.

(2) Push in the fuel cut-off.

(3) Press and hold the START switch and hold the airbox heater switch at ON at the same time.

(4) If the engine does not start after cranking for 45 seconds, release the airbox heater switch and press the accelerator pedal about halfway down. Keep holding the start switch.

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PERFORMANCE MEASURES (cont)

Note. Cranking time before pressing the accelerator pedal changes with temperatures. Crank 45 seconds for -25°F. Crank 5 seconds less for each 5 degrees above -25°F to the shortest time of 10 seconds. Crank 10 seconds at all temperatures from +10 to +40°F.

(5) If the engine does not start when you press the accelerator pedal, release the pedal and hold the airbox heater switch at ON for 15 to 20 seconds, then OFF for 2 to 4 seconds. Keep holding the start switch.

4. The following measures apply to either type heater:

a. Run the engine for 3 to 5 minutes at 650 to 700 rpm.

Note. If the temperature is below -25°F and the carrier has an engine coolant heater set, now is the time to turn off the coolant heater and close the valve.

b. Set the hand throttle to run the engine at 1,200 to 1,500 rpm for about 5 minutes.

c. Push in the throttle and check the instrument panel (BATT GENERATOR, FUEL GAGE, RPM, and TEMP indicators should be normal, master switch light should be on) (fig 8).

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PERFORMANCE MEASURES (cont)

e. Push in the fuel cut-off and press the START switch to restart the engine.

CAUTION: If the engine doesn't start after 30 seconds of cranking, release the START switch and let the starter cool for 30 seconds before you try again. If you can't restart the warm engine in five tries, troubleshoot it.

f. Put the shift lever in the 2-3 range and set the hand throttle to run the engine at 800-1,000 rpm for about 10 minutes. This is to warm up the transmission.

g. Push in the hand throttle, set the shift lever in N range, and do the preventive-maintenance hot checks.

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored, M113A1, chap 2, pp 2-80 thru 2-88.

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TROUBLESHOOT AN M113A1

CONDITIONS

Under all conditions, given a malfunctioning M113A1 with BII.

STANDARDS

1. Isolate each malfunction, perform the test or inspection, and take corrective actions as specified in the performance measures.
2. If a malfunction is not listed or is not corrected by listed corrective actions, report it to organizational maintenance.

PERFORMANCE MEASURES

Note. The following is organized into sections which list the components. Each section will list the malfunction, how to test or inspect, and corrective action to take.

Section I. ENGINE

1. ENGINE DOESN'T CRANK WHEN YOU PRESS THE STARTER SWITCH.

   Step 1. Check to see if the master switch is OFF.

   Turn it ON.

   Step 2. Check to see if the range selector lever is in the N position.

   Place it in the N position.

   Step 3. Check to see if the battery has current.

   Troubleshoot the electrical system (see section 7).

   Step 4. Check to see if engine, transmission, or transfer gearcase, is faulty.

   Disengage the engine, disconnect and try to start. If the engine cranks, the transmission or transfer gearcase is faulty. Either way, report it to organizational maintenance.

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PERFORMANCE MEASURES (cont)

2. ENGINE CRANKS BUT DOESN'T START.

Step 1. Check to see if the fuel cutoff control handle is out.

Push the handle in.

Step 2. Check to see if there is enough fuel in the fuel compartment.

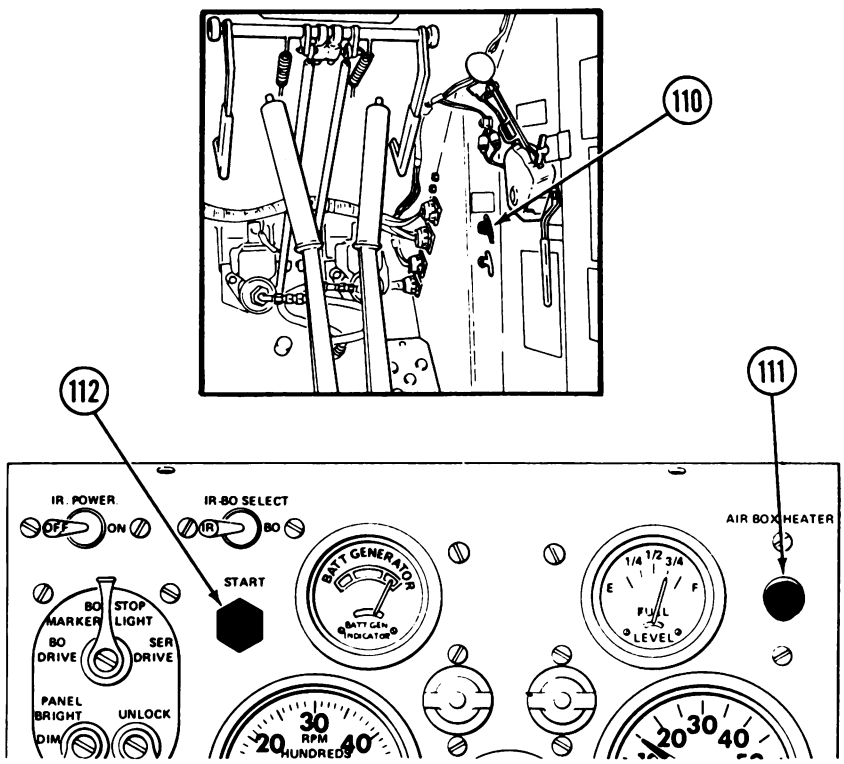
Refuel the carrier.

Step 3. Check to see if the fuel is shut off at the tank.

Open the valve.

Step 4. If the temperature is colder than +40°F, check to see if the air box heater is on.

a. Turn the master switch ON and pull out the fuel shutoff (110).



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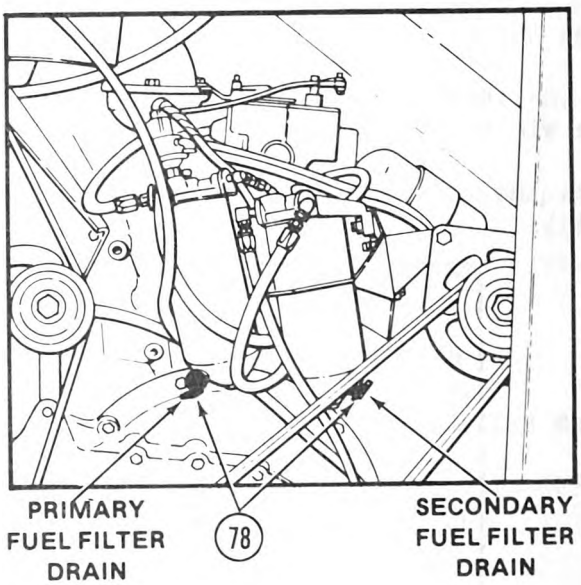
PERFORMANCE MEASURES (cont)

b. Turn the airbox heater switch (111) ON, press the start switch (112) and look for puffs of black smoke from the engine exhaust. If you see the smoke, the heater is OK. If you don't see smoke, report it to organizational maintenance.

Step 5. Check to see if there is water in the fuel.

Drain any water and deposits out of the primary and secondary fuel filters. Put a suitable container under the drain valve (78) at the bottom of the filter, open the valve, and drain until clear fuel runs out. Then close the valve.



Step 6. Check to see if the engine is getting enough air.

a. Clean the air cleaner element.

WARNING: Do not clean the element in gasoline or petroleum solvent.

b. You can clean the air cleaner element anytime by jarring it to knock dirt loose. If you don't have to use the carrier for a few hours, you can wash the element. Or, if you have access to compressed air, you can blow the filter clean. Here's how:

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PERFORMANCE MEASURES (cont)

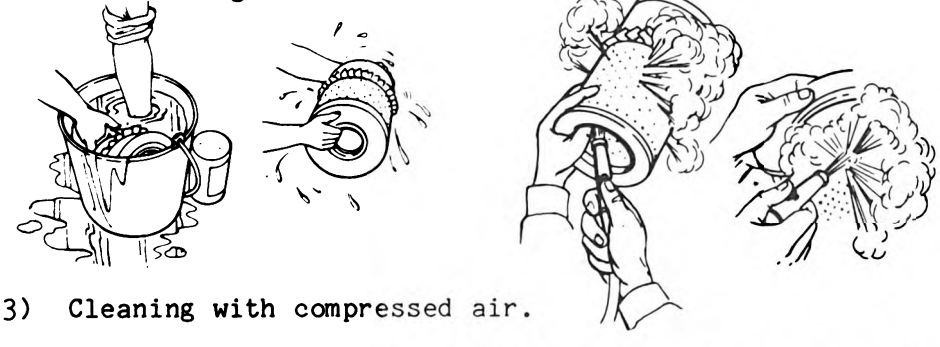
(1) Cleaning by jarring.

(a) Open end element--Beat the fins gently with your hands, then tap the sides to knock dirt out. Go easy, so you don't damage the fins. Do not hit or drop the element on its ends.

(b) Closed end element--Tap the sides gently with your hands.

(2) Cleaning with water. Wash the element with warm water and GI hand soap. Make sure it's dry before you put it back in the carrier.

CAUTION: Dry the air cleaner element before you put it back in the carrier. If you try to drive with a wet element, you'll end up with an air cleaner full of mud and a carrier that won't go.



(3) Cleaning with compressed air.

WARNING: Wear safety goggles when you use compressed air. Do not point the stream of air at yourself or anyone else.

(a) Open end element--Direct 100 psi compressed air through the element from the inside to the outside, then down the outside all around, then inside to outside again.

(b) Closed end element--Direct 100 psi compressed air through the element from the inside to the outside.

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PERFORMANCE MEASURES (cont)

4. ENGINE CRANKS TOO SLOW TO START.

Step 1. Check to see if the batteries are run down.

Use outside power or tow-start the carrier. If the cause of weak batteries is not obvious, troubleshoot the electrical system (section VII).

Step 2. If the temperature is colder than -25°F, check to see if the engine disconnect is engaged.

Disengage the engine disconnect.

CAUTION: Never move the engine disconect handle when the engine is running.

5. ENGINE LABORS, RUNS ROUGH, STALLS, OR DOESN'T PUT OUT FULL POWER.

Step 1. Check to see if engine is getting enough air. Clean the air cleaner element (see section 1B).

Step 2. Check to see if there is water in the fuel. Drain the primary and secondary fuel filters.

Step 3. Operating at a high elevation. The carrier will normally lose power at high elevations (in mountains or other high terrain). If the carrier runs rough, or power loss is bad, tell organizational maintenance.

6. ENGINE OVERHEATS.

CAUTION: Do not operate the carrier if the coolant temperature reaches and stays above +230°F.

Step 1. Check to see if the engine access panels are in place. Replace panels.

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PERFORMANCE MEASURES (cont)

Step 2. Hard running in hot weather. Follow the preautions for driving in extreme heat. When the engine overheats, stop the carrier and run the engine at 1,200-1,500 rpm until the coolant temperature comes down.

Notes for operating in extreme heat.

1. Check the gages and warning lights often while you are driving.
2. Stop and fix any problem as soon as it comes up, or as soon as the tactical situation will let you stop.
3. Check the radiator, air cleaner, and batteries often.
4. Keep the carrier in shelter or shade as much as possible.
5. If shelter isn't available, cover the carrier with tarpaulins when it's parked. If you can't cover the entire carrier, at least cover the air intake and exhaust grilles.
6. Keep the carrier clean. Fungus and mildew can grow fast in conditions of high heat and humidity. Looking the carrier over and cleaning it often is the best cure.
7. Lubricate frequently. Heat, sand, dust, humidity, and salt all have a bad effect on lubricants and moving parts.
8. Don't drive in a low transmision range when you don't have to.
9. Don't let dirt, sand, or bugs build up in the radiator fins.

Step 3. Check to see if the coolant level is low. Add coolant as needed. Check for coolant leaks, and report any you find to organizational maintenance.

Step 4. Check to see if the radiator cap is not sealing tight. Make sure the cap is on straight and tight. If the cap is damaged or the seal is broken, report it to organizational maintenance.

Step 5. Check to see if there is enough air moving through the radiator. Remove dirt or other blockage from the intake grille, exhaust grille, fan intake, or radiator fins.

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PERFORMANCE MEASURES (cont)

Step 6. Check to see if the cooling fan is working right. Look for loose or broken fan belts. If any belt is loose, broken, or badly worn, report it to organizational maintenance.

Step 7. Check to see if the engine oil level is low. Add oil as needed (LO 9-2300-257-12).

7. ENGINE OIL HI TEMP-LO PRESSURE WARNING LIGHT COMES ON.

CAUTION: Do not operate the carrier if the warning light comes on with the engine running. The light should go out within 5-10 seconds after starting.

Step 1. Check to see if the engine oil level is low. Add oil as needed (LO 9-2300-257-12).

Step 2. Check to see if the engine is overheating (see section II).

Section II. TRANSMISSION

8. TRANSMISSION DOES NOT DRIVE IN ANY RANGE.

Step 1. Check to see if the engine disconnect is engaged. Engage the engine disconnect.

Remove the engine access panel next to the driver's seat and disengage the engine disconnect (7). Lift the lock on the control handle and push the handle in as far as it will go. This disconnects the engine from the rest of the power plant, so the starter does not have to work so hard.

CAUTION: Never try to move the engine disconnect handle when the engine is running.

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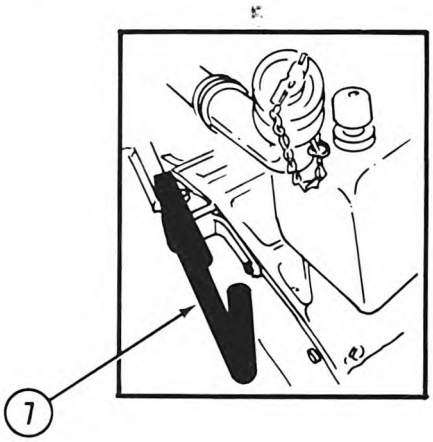
PERFORMANCE MEASURES (cont)



Step 2. Check to see if the transmission oil level is low. Add oil as needed (LO 9-2300-257-12).

9. **TRANSMISSION OIL HI TEMP WARNING LIGHT COMES ON.**

CAUTION: Do not operate the carrier if the warning light comes on.

Step 1. Bad driving habits.

Don't drive with the range selector in the 1 range any longer than you have to.

Step 2. Check to see if the transmission oil level is low.

Add oil as needed (LO 9-2300-257-12).

Section III. DIFFERENTIAL

10. **DIFFERENTIAL OIL HI TEMP WARNING LIGHT COMES ON.**

CAUTION: Do not operate the carrier if the warning light comes on.

Step 1. Check to see if the differential oil level is low.

Add oil as needed (LO 9-2300-257-12).

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PERFORMANCE MEASURES (cont)

Step 2. Check to see if the quick disconnect coupling in the differential lube line is improperly connected.

Connect coupling with pin on body aligned with groove on collar.

Release and rotate the collar.

Section IV. FINAL DRIVE

11. FINAL DRIVE RUNS HOT.

Step 1. Check to see if the final drive oil level is low.

Add oil as needed (LO 9-2300-257-12).

12. NO POWER FLOW THROUGH THE TRANSFER GEARCASE WHEN THE ENGINE IS RUNNING.

Step 1. Check to see if the engine disconnect is engaged. Engage the engine disconnect.

CAUTION: Never move the engine disconnect handle while the engine is running.

Section V. TRANSFER GEARCASE

13. TRANSFER GEARCASE RUNS HOT OR NOISY.

Step 1. Check to see if the transfer gearcase oil level is low.

Add oil to the transfer gearcase as needed (LO 9-2300-257-12).

Section VI. TRACKS AND SUSPENSION

14. CARRIER PULLS TO ONE SIDE.

Step 1. Crowned road or sloping ground.

The carrier will normally pull to one side of any slope.

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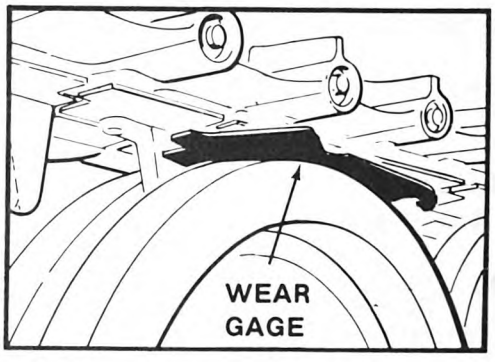
PERFORMANCE MEASURES (cont)

Step 2. Check to see if track tension is equal on both sides.

Check and adjust track tension regularly. To check measure the distance between the top of the second roadwheel and the bottom of the track on each side. Drive the carrier onto smooth, level ground and let it coast to a stop without using the brakes. Measure with gage 5120-01-041-9920. Place the gage on top of the second roadwheel and adjust track tension until the bottom of the track touches the gage and rests on third roadwheel. Pump GAA into the lubrication fitting on the track adjuster to tighten tension; bleed grease to loosen tension.



Step 3. Check to see if mud, dirt, or snow has built up on one track.

15. CARRIER THROWS TRACK.

Step 1. Check to see if the track is loose or worn.

Adjust the track tension (see section VI, step 2).

Step 2. Bad driving habits.

Do not use the pivot steer above 15 mph. Avoid sharp turns at high speed or on soft ground.

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PERFORMANCE MEASURES (cont)

Step 3. Check to see if dirt, mud, or other material has built up in the track.

Keep the track clean. If you have to run through mud or snow, have organizational maintenance take off the track shrouds. On soft ground or in heavy brush, turn in a series of short turns so the track can clear itself.

16. Too much noise in the track or suspension.

Step 1. Check to see if track tension is wrong.

Adjust the track tension (see section VI, step 2).

Step 2. Check to see if any track shoes are badly worn.

Report this to organizational maintenance.

Step 3. Check to see if any track pads are loose or worn.

Report this to organizational maintenance.

Step 4. Check to see if the wrong sprockets or cushions are installed on the vehicle.

Report this to organizational maintenance.

17. CARRIER RIDES TOO HARD.

Step 1. Check to see if the vehicle has one or more bad shock absorbers.

Feel the shocks after running. Good shocks will be noticeably warmer than the hull. A cool shock is a bad one. Report it to organizational maintenance.

Section VII. ELECTRICAL SYSTEM

18. BATTERIES DISCHARGED.

Step 1. Check to see if the battery electrolyte level is low.

Add distilled water as needed.

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PERFORMANCE MEASURES (cont)

Step 2. Too much use of electrical equipment when the engine is not running.

When you use a lot of electrical equipment at the halt, run the engine periodically to recharge the batteries.

19. NO BATTERY CURRENT.

Step 1. Check to see if the battery cable connections are loose, disconnected, or corroded.

Fix loose or disconnected connections.

20. WITH THE MASTER SWITCH ON, THE INDICATOR LAMP DOES NOT LIGHT.

Step 1. Check to see if the lamp is burned out, or there are loose connections in the lamp leads.

If the battery gage shows normal reading and other electrical equipment and lights are working, the lamp is bad. You can drive the carrier, but be sure to turn the master switch OFF when you shut down the carrier. Report this to organizational maintenance.

Step 2. Check to see if the batteries are dead or there are faulty battery cable connections.

Tighten loose or disonnected battery cables. If you have to operate the carrier with dead batteries, tow start (see p 2-76, TM 9-2300-257-10) or use auxiliary power to start the engine (see p 2-75, TM 9-2300-257-10).

Section VIII. BILGE PUMPS

21. BILGE PUMPS DO NOT WORK WITH THE BILGE PUMP SWITCH ON.

Step 1. Check to see if the master switch is ON.

Turn the master switch ON.

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PERFORMANCE MEASURES (cont)

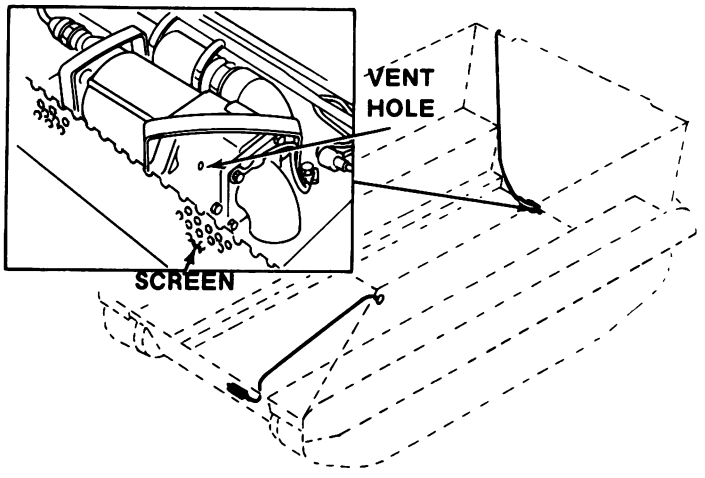
Step 2. Check to see if the inlet screens or outlets are clogged.

Clean the inlet screen or outlets.

Step 3. Check to see if the bilge pump vents are blocked.

a. Clean the vents. If you can't get to the bilge pump to clean it because of a load in the cargo compartment, cycle the bilge pump switch ON and OFF a few times. That will usually start the pump.

b. Each bilge pump has a vent hole that you need to keep clean. If the vent hole gets clogged, the pump could be airlocked. To clean the vent holes, just run a wire back and forth in each hole a few times.



Section IX. PERSONNEL HEATER KIT

22. HEATER DOESN'T START WITH THE RUN/OFF/START SWITCH HELD IN THE START POSITION.

Step 1. Check to see if the master switch is turned ON.

Turn it ON.

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PERFORMANCE MEASURES (cont)

23. HEATER OVERHEATS AND STOPS.

    Step 1. Check to see if the heater air intake, exhaust pipe, or warm air outlet is blocked.

    Find and take away whatever is blocking the heater system.

24. HEATER OVERHEATS AND DOESN'T STOP.

    Step 1. Check to see if the heater is good.

    Turn the heater OFF and report it to organizational maintenance.

25. HEATER DOESN'T PRODUCE ENOUGH HEAT.

    Step 1. Check to see if the HI/LO switch is in the LO position.

    Move it to the HI position.

Section X. ENGINE HEATER COOLANT HEATER KIT

26. HEATER DOESN'T START WITH THE RUN/OFF/START SWITCH HELD IN THE START POSITION.

    Step 1. Check to see if the master switch is turned ON.

    Turn it ON.

27. COOLANT HEATER OVERHEATS.

    Step 1. Check to see if one or both shutoff valves are closed.

    Open the valves.

28. COOLANT HEATER OUTPUT TOO LOW.

    Step 1. Check to see if the HI/LO switch is in the LO position.

    Move it to the HI position.

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PERFORMANCE MEASURES (cont)

29. BATTERIES OVERHEAT.

Step 1. The air temperature is too high to need the engine coolant heater.

Turn off the heater. You don't need it above -25°F.

Step 2. The engine is running at the same time as the engine coolant heater.

Turn off the engine coolant heater as soon as the engine starts.

Section XI. GAS PARTICULATE UNIT

30. INSUFFICIENT AIR FLOW AT ALL STATIONS.

Step 1. Check to see if the spring clip is attached.

Pull the spring clip away.

Step 2. Check to see if hoses are kinked or pinched.

Straighten or replace hoses.

Step 3. Check to see if there are any loose connections.

Tighten loose connections.

Step 4. Check to see if electrical power is low.

If any of above does not work, report it to organizational maintenance.

31. AIRFLOW TOO HIGH ALL STATIONS.

Check to see if the air purifier is out of adjustment.

Report this to organizational maintenance.

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PERFORMANCE MEASURES (cont)

32. GAS PARTICULATE FILTER WILL NOT OPERATE WHEN SWITCH IS ON.

Step 1. Check to see if the ground wire is loose or missing.

Report this to organizational maintenance.

Step 2. Check to see if the electrical cable assemblies are loose or missing.

Report this to organizational maintenance.

Step 3. Check to see if the switch or circuit breaker is defective.

Report this to organizational maintenance.

REFERENCES

TM 9-2300-257-10, Operator's Manual for M113A1, chap 3, pp 3-2 thru 3-13.

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EXTINGUISH A FIRE ON AN M113A1

CONDITIONS

Given an M113A1.

STANDARDS

Within 30 seconds after you have detected the fire, completely extinguish the fire or abandon the vehicle.

PERFORMANCE MEASURES

1. To extinguish an engine compartment fire (figs 1 and 2).

    a. From inside the vehicle, using the fixed fire extinguisher:

        (1) Pull out the engine fuel shut off handle (fig 1).

        (2) Remove the safety pin from the interior fire extinguisher actuating handle (located on the interior left wall behind the driver's compartment, fig 2).

        (3) Rotate the handle downward to set off the fire extinguisher.

        (4) Evacuate the vehicle.

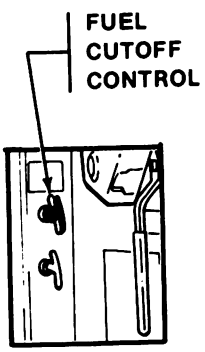

Figure 1.

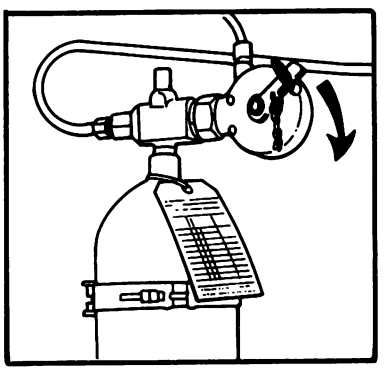

Figure 2.

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PERFORMANCE MEASURES (cont)

b. From outside the vehicle:

(1) Make sure the crew is out of the vehicle.

(2) To set off the fire extinguisher, pull and release the exterior actuating handle, located on the top left deck (fig 3).

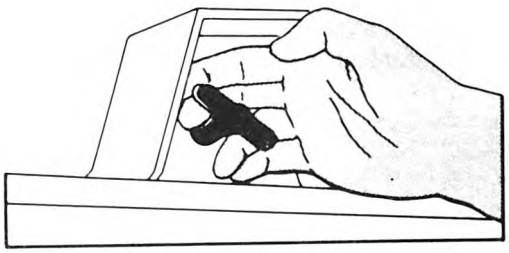

Figure 3.

2. To extinguish a crew compartment fire with the portable fire extinguisher:

a. Evacuate the vehicle.

b. Remove the fire extinguisher from brackets at right rear of personnel compartment (fig 4).

c. Remove safety pin from the actuating handle.

d. Point the nozzle at the base of the fire and pull the trigger to set off the extinguisher.

PORTABLE FIRE EXTINGUISHER

Figure 4.

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TASK SUMMARY 071-333-6519 (cont)

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored, M113A1, chap 2, sec II, p 19.

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PERFORM BEFORE-OPERATION DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES ON AN M113A1

CONDITIONS

Given an M113A1 carrier with crew, basic issue items (BII), blank DA Forms 2408-1 and 2404, necessary cleaning equipment and TM 9-2300-257-10.

STANDARDS

Perform before-operation checks and services in accordance with the performance measures and TM 9-2300-257-10.

PERFORMANCE MEASURES

1. Preventive maintenance is planned as a job for the crew. Use your flashlight when performing maintenance during hours of darkness.

   Note. Numbers used in the task refer to callouts on the pictures within the task.

   WARNING: Ear protection must be worn when operating this carrier to prevent possible damage to hearing.

   a. Inspect for good condition: Look at the item to see if it's safe and serviceable.

   b. Inspect for correct assembly or stowage. Look at the component to see if it's installed as an assembly, with NO missing parts, and make sure it's installed in the right place.

2. Check the exterior of the vehicle for damage, missing items, or leaks that may have occurred after previous use.

   a. Bolts, nuts, and screws. Check them all for obvious loosness, missing, bent or broken condition. You can't try them all with a tool, of course, but look for chipped paint, bare metal, or rust around the bolt heads. If you find one you think is loose, tighten it, and report it to your mechanic as soon as possible.

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PERFORMANCE MEASURES (cont)

b. Welds. Look for loose or chipped paint, rust, or gaps where parts are welded together. If you find a bad weld, report it to organizational maintenance.

c. Electric wires and connectors. Look for cracked or broken insulation, bare wires, and loose or broken connectors. Tighten loose connectors and make sure the wires are in good shape.

d. Hoses and fluid lines. Look for wear, damage, and leaks, and make sure clamps and fittings are tight. Wet spots show leaks, and a stain around a fitting or connector can mean a leak. If a leak comes from a loose fitting or connector, tighten it. If something is broken or worn out, have organizational maintenance replace it.

3. Check these items prior to starting the engine:

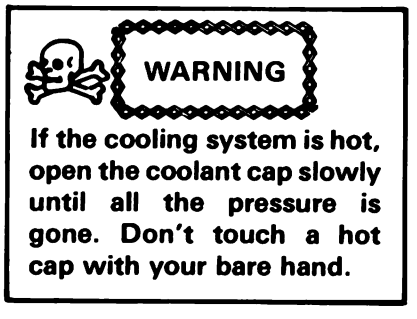
a. Coolant (fig 1).

(1) Make sure the coolant reaches the bottom of the filler neck (1).

(2) Add coolant as needed.

(3) Inspect the radiator, hoses and lines for leaks. If you find any, report them to organizational maintenance.

WARNING: If the cooling system is hot, open the coolant cap slowly until all the pressure is gone. Do not touch a hot cap with your bare hand.


WARNING
If the cooling system is hot, open the coolant cap slowly until all the pressure is gone. Don't touch a hot cap with your bare hand.

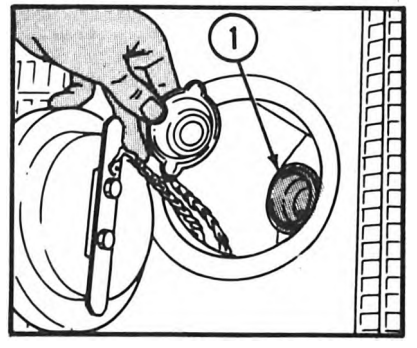


Figure 1. Checking coolant.

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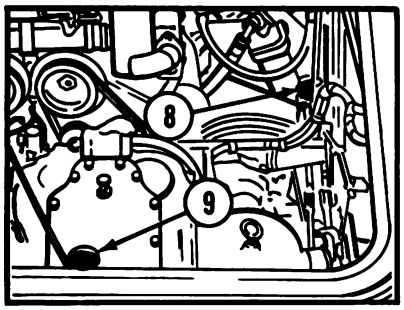
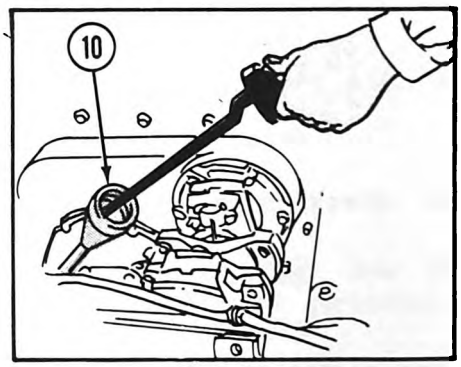
PERFORMANCE MEASURES (cont)

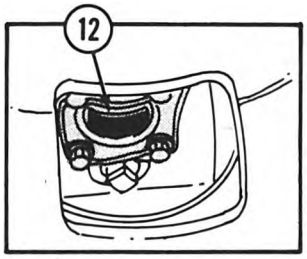
b. Oil levels (fig 2). Check the oil level of the engine (7), transmission (8), differential (9), final drives (10), transfer gearcase (11), fan gearbox (12), and ramp hydraulic fluid reservoir (13). Each dipstick should show oil between the ADD and FULL marks. Make sure the gearcase filler cap is closed and the breather hole (14) in the gage rod tube is open. Fan gearbox oil level (12) must be between ADD and FULL marks on the sight indicator. With the ramp down, the hydraulic fluid must be half way up in the sight window (13). Add oil in accordance with LO 9-2300-257-12.



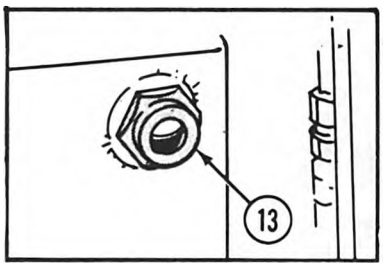
Checking transmission and and differential.



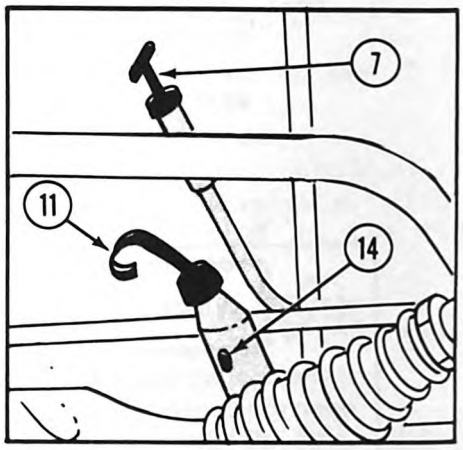
Checking the final drives.



Checking fan gearbox.



Checking ramp hydraulic fluid reservoir.



Checking the engine oil level.

Figure 2. Checking oil levels.

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PERFORMANCE MEASURES (cont)

c. Air cleaner restriction indicator (fig 3). If your carrier is equipped with an air cleaner restriction indicator (18), check it now. If at any time the sleeve is locked up so you see only red in the window, clean the air cleaner element. When the element is clean, press the rubber dome on the indicator to reset it.

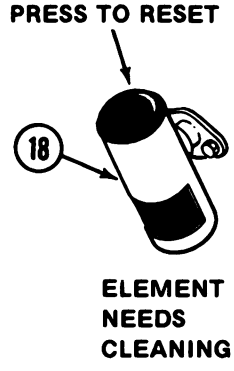

Figure 3. Checking air cleaner restriction indicator.

d. Fire extinguishers (fig 4). Check the portable fire extinguisher to make sure the seal (2) is not broken and the inspection card (3) is up to date. Then check the seal and locking wire (4) and the inspection card (5) on the fixed extinguisher bottle, and check the seal (6) on the outside pull handle. If the locking wire is broken, the extinguisher must be removed and weighed. Report it to the organizational maintenance.

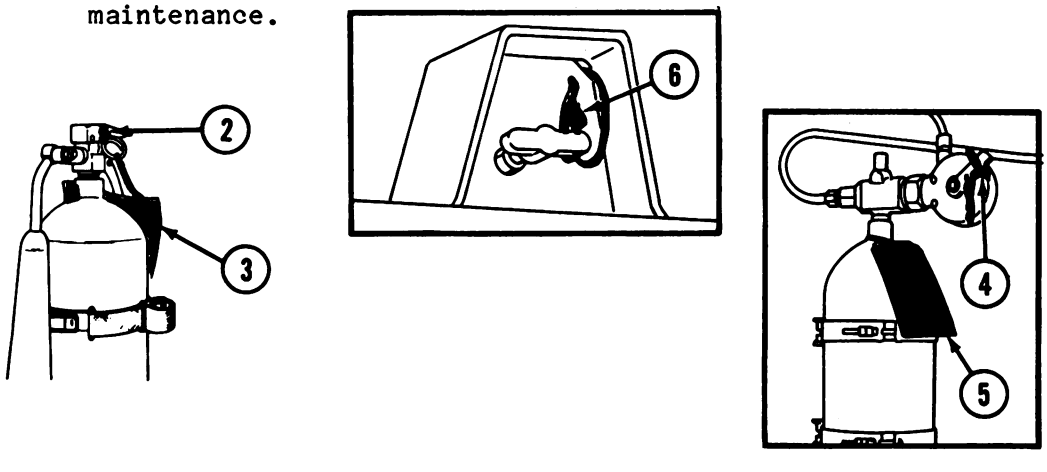

Figure 4. Checking the fire extinguishers.

e. Periscopes. Check all periscopes for secure mounting. They must be tight in their channels. Clean with lens tissue.

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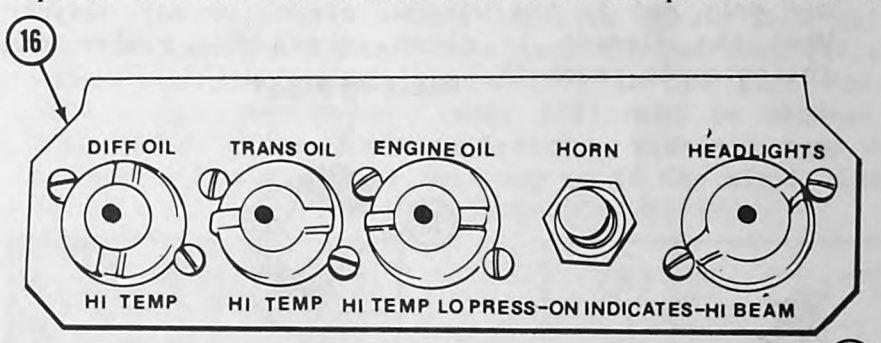
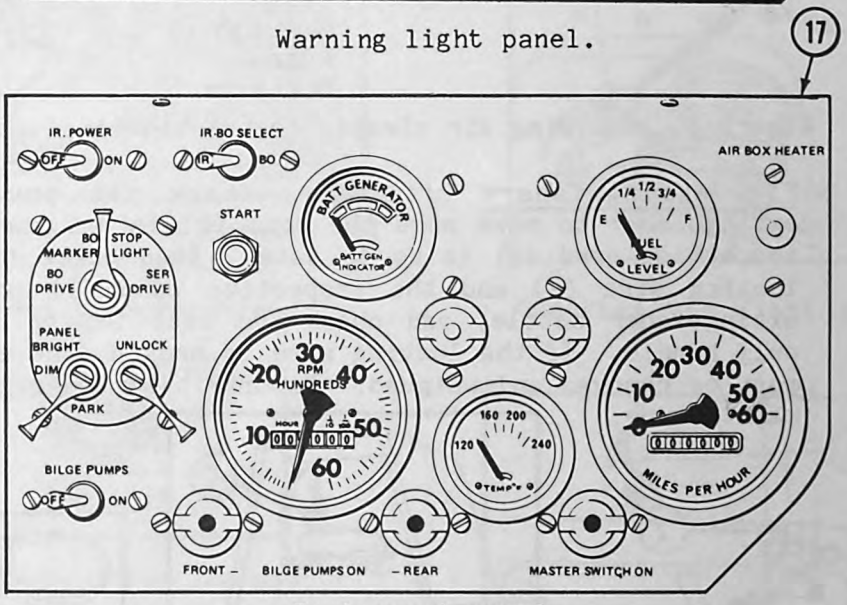
PERFORMANCE MEASURES (cont)

f. Instrument and warning light panels (fig 5). Before you start the engine, the instrument panel and the warning light panel (16 and 17) should look like the pictures on this page.



Warning light panel.



Instrument panel.

Figure 5. Checking instrument and warning light panel.

4. Start your carrier's engine (see Task Summary 071-333-6517, Start the Engine on an M113A1).

WARNING: Carbon monoxide gas is deadly poison. Play it safe, make sure the power plant access panels are closed tight before you start the engine.

5. When the engine is warmed up, you can go on to the next check.

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PERFORMANCE MEASURES (cont)

6. Check the transmission oil level (fig 6).

   a. Make sure the brakes are set hard.

   b. Put the shift lever in 2-3 range and run the engine at about 1,000 rpm for 3-5 minutes. Reduce the speed to idle (650-700 rpm), and move the lever through all ranges.

   c. Put the shift lever in N (neutral) range and set the hand throttle to run the engine at 1,500 rpm.

   d. Open the power plant door and check the transmission oil level. The dipstick (31) should show the oil between ADD and FULL-HOT. Add oil as needed (see LO 9-2300-257-12).

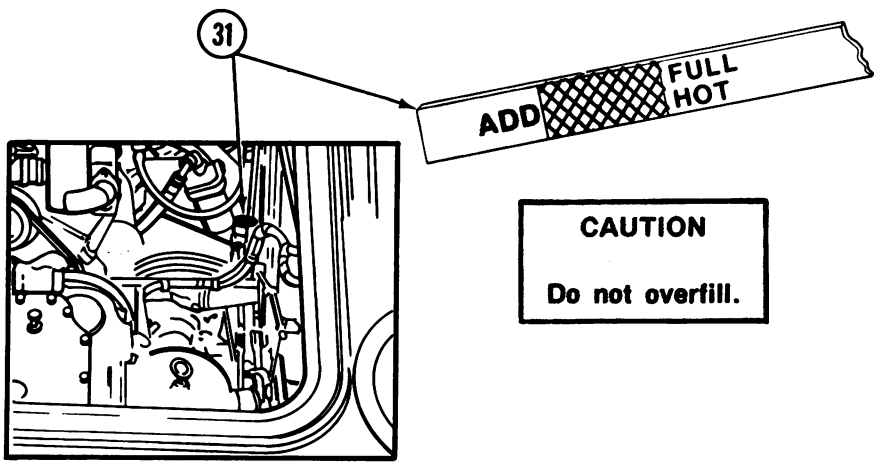

Figure 6. Checking transmission oil level.

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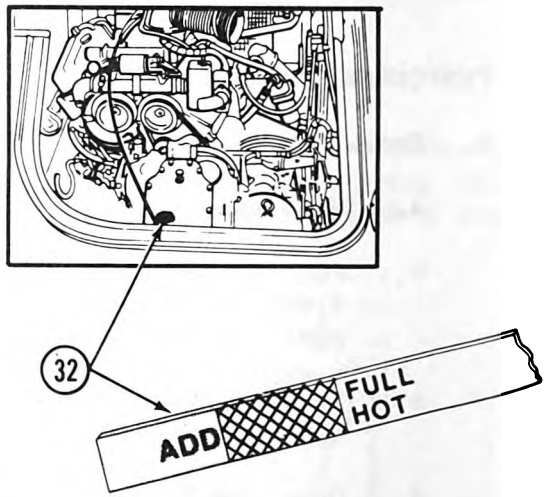
PERFORMANCE MEASURES (cont)

7. Check the differential oil level. With the engine running at 650-700 rpm, check the differential oil level. Dipstick (32) should show between ADD and FULL. Add oil as needed. (See LO 9-2300-257-12.)

CAUTION: Do not overfill.



CAUTION

Do not overfill.

Figure 7. Checking differential oil level.

8. Check the communications. Turn on the master switch and turn on power at amplifier AM 1780/VRC. Connect the CVC helmet cable connectors (33) to the C-2297/VRC receptacles. The cable with the yellow band (longer cable) connects to the receptacle with the yellow mark. Make sure connectors are tight. Adjust the volume knob (34) as desired. With the CVC helmet on, turn on the AN/VRC-1 and check intercommunication between crew members (35).

Note. Power at amplifier AM 1780/VRC must be turned on for the crew member intercom set controls to function.

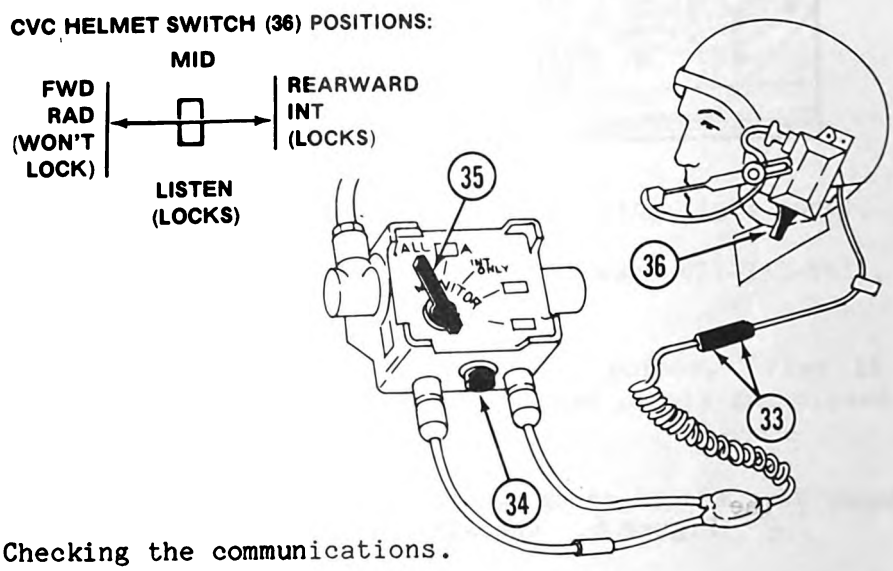


Figure 8. Checking the communications.

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PERFORMANCE MEASURES (cont)

9. Check the caliber .50 machinegun (if mounted).

   WARNING: Make certain the machinegun is clear of ammunition and the barrel is free of obstructions.

   Check the machinegun mount (37) for missing pins and for tightness of all fastenings and operating parts. Operate the ammunition box locking latch (38). When locked, the ammunition box must be sturdy and secure.

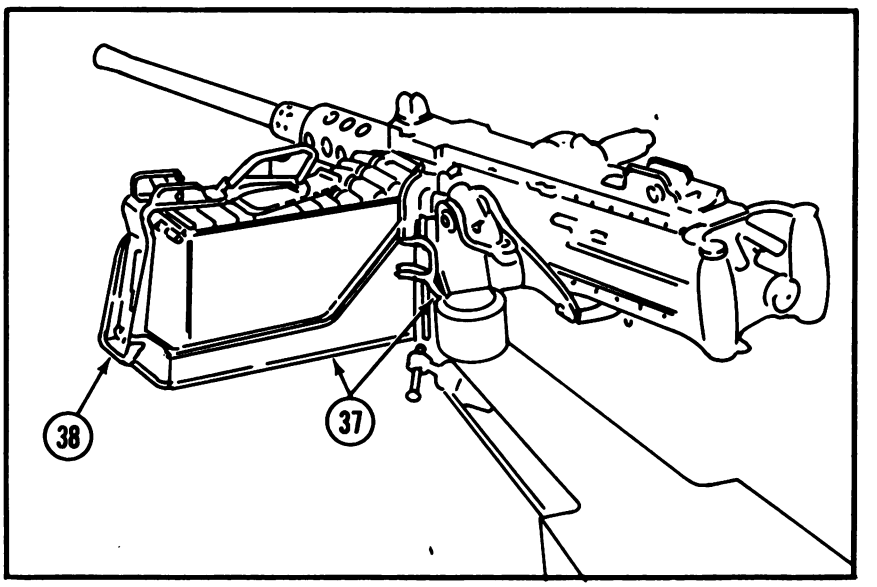

Figure 9. Checking the caliber .50 machinegun.

10. Correct the deficiencies noted during the checks and inspections in performance measures 1 thru 9 above, if they are within the operator's capabilities.

11. Report all deficiencies not within the operator's capability to repair to organizational maintenance on DA Form 2404 (see para 3-4, TM 38-750).

12. Make the required entries on DA Form 2408-1, (see para 4-5, TM 38-750).

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored, M113A1, chap 2, pp 2-22 thru 2-35.
TM 38-750, The Army Maintenance Management System (TAMMS), w/C2, para 3-4 and 4-5.

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PERFORM DURING-OPERATION DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES ON AN M113A1

CONDITIONS

Given an M113A1 with BII, crew, vehicle historical record, TM 9-2300-257-10, DA Form 2404, and necessary cleaning equipment.

STANDARDS

1. Check the carrier during operation for the following:
   a. Dirty air cleaner.
   b. Improper steering, braking, shifting, or throttle control.
   c. Overheating of the roadwheels, idler wheels, final drive bearing, or shock absorbers.
   d. Improper indications on the instrument panel.
2. Correct deficiencies that are within the operator's capability.
3. Report all non-correctable deficiencies on DA Form 2404.

PERFORMANCE MEASURES

1. During operation of the carrier, check the following areas:
   a. Steering, braking, shifting, and throttle controls. Every time you use the differential steering levers, the shift lever, the hand throttle, or the accelerator pedal, be alert for any binding, grabbing, or looseness in the controls. Get to know your carrier's normal response to the controls. If the response changes, find out why.
   b. Instrument panel. Check your instrument panel and warning light panel once in a while. Except for the speed, which is up to you, the panels should look like those in figure 1. A red dot means a light is ON, a black dot means it's OFF. If differential oil, transmission oil, or engine oil warning lights come on, stop and troubleshoot right away.

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PERFORMANCE MEASURES (cont)

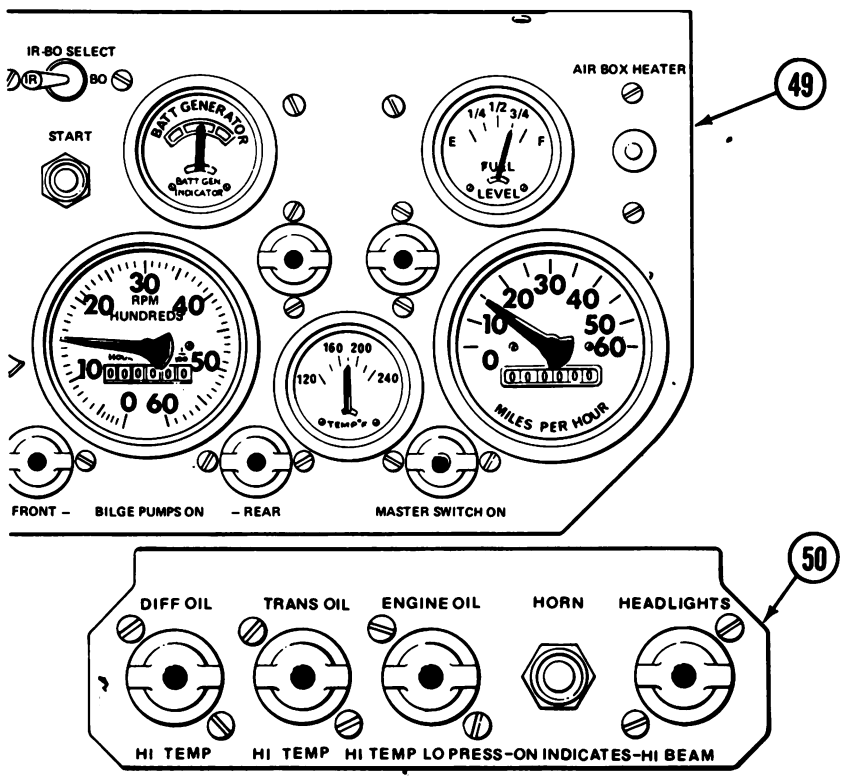

Figure 1. Checking the instrument and warning panels.

c. Air cleaner restriction indicator. If your carrier is equipped with an air cleaner restriction indicator (fig 2), check it during carrier operation. The green sleeve should be part way up the window. The exact position will depend on the engine load and rpm as well as the air cleaner condition. If at any time the sleeve is locked up so you see only red in the window, clean the air cleaner element (see TM 9-2300-257-10, p 3-29). When the element is clean, press the rubber dome on the indicator to reset it.

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PERFORMANCE MEASURES (cont)

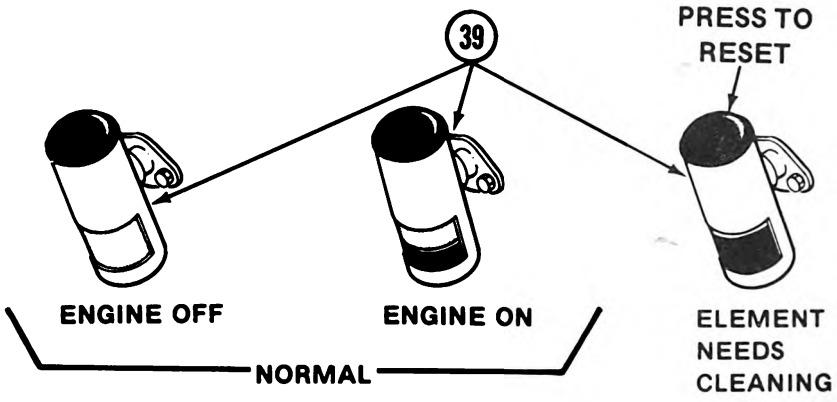

Figure 2. Checking the air cleaner restriction indicator.

Note. If your carrier is not equipped with an air cleaner indicator, observe the engine exhaust during operation. The presence of a dark (blue- black) smoke may be due to a dirty air cleaner element. If cleaning the element does not stop the smoking, report it to organizational maintenance.

d. Roadwheel, idler wheel, final drive bearings, and shock absorbers.

WARNING: Be careful when you feel the hubs, shock absorbers, and final drive. They can heat up enough to burn you.

(1) At halts, feel the roadwheel hubs (fig 3A), idler wheel hubs (fig 3B), and final drive housing (fig 3C). If any of them feels hotter than the one next to it, you have a bearing that needs service or maintenance. Report it to organizational maintenance.

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PERFORMANCE MEASURES (cont)

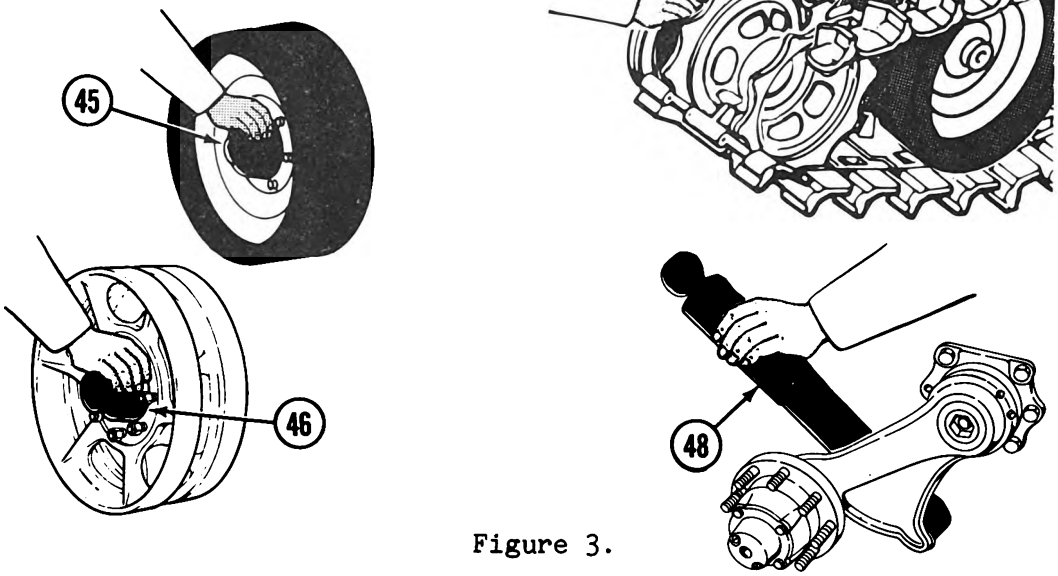

Figure 3.

(2) When you're checking the wheel hubs and final drives, lay a hand on the shock absorbers (fig 1D). After a good run the shocks should warm up enough so you can tell they've been working. A cold one is no good. Report it to organizational maintenance.

2. Correct deficiencies noted during the checks and inspection in performance measure 1 above, if they are within the operator's capability.

3. Report all deficiencies not within the operator's capability to repair to organizational maintenance on DA Form 2404.

REFERENCES

TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full Tracked, Armored, M113A1, chap 2, pp 2-36 thru 2-41.
TM 38-750, The Army Maintenance Management System (TAMMS), C2, chap 3, pp 3-4 thru 3-8.

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PERFORM AFTER-OPERATION PREVENTIVE MAINTENANCE CHECKS AND SERVICES ON AN M113A1

CONDITIONS

Given an M113A1 with BII, equipment historical record, TM 9-2300-257-10, DA Form 2404, and necessary cleaning equipment.

STANDARDS

Perform after-operation checks and services in accordance with the performance measures and TM 9-2300-257-10.

PERFORMANCE MEASURES

1. Check the tracks and suspension (fig 1).

   a. Inspect the tracks (57), roadwheels (58), and idler wheels (59) for obvious damage. Make sure they are in shape for safe operation.

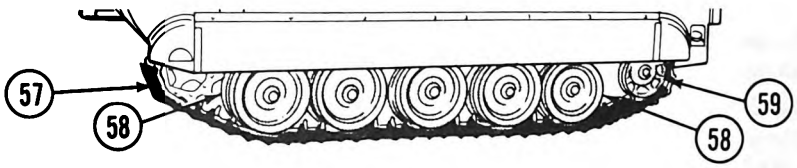

Figure 1. Track suspension system.

   b. Make sure the torsion bars are OK. Try to lift each roadwheel (58) with your crowbar. If any roadwheel comes up easily, you have a broken torsion bar. Report it to organizational maintenance.

   c. Look at all wheel hubs.

      (1) Oil should be at least halfway up the sight glass (60), and the glass must not be cracked or broken.

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PERFORMANCE MEASURES (cont)

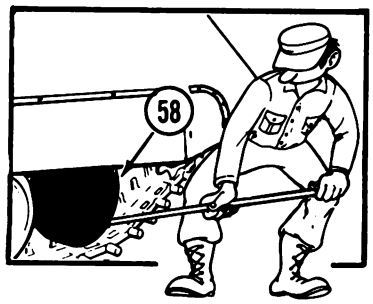

Figure 2. Checking the torsion bars.

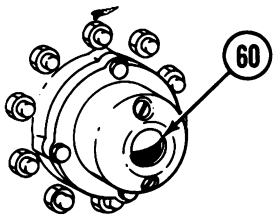

Figure 3. Checking the wheel hubs.

(2) If you see bubbles in the oil, there is water in it. Report it to organizational maintenance.

d. If your carrier has grease-filled hubs, make sure you see only grease. Add grease until it comes out of the pressure relief valve (61). Service grease-filled hubs in accordance with LO 9-2300-257-12.

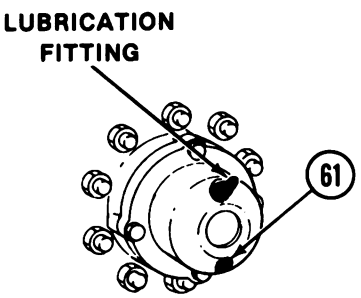

Figure 4. Checking the lubrication fittings.

2. Check the roadwheel, idler wheel, final drive bearings, sprockets, and shock absorbers (fig 5).

WARNING: Be careful when you feel the steel hubs, shock absorbers, and final drive housings. They can heat up enough to burn you.

a. After operation, feel the roadwheel hubs (71), idler wheel hubs (72), and final drive housings (73). If any of them feel hotter than the ones next to it, you have a bearing that needs service or maintenance. Report it to organizational maintenance.

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PERFORMANCE MEASURES (cont)

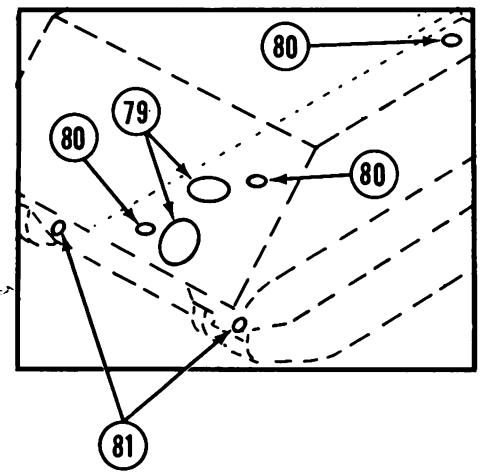

Figure 7. Hull access drain covers and plugs.

WARNING:	Make sure the engine is shut OFF, the master switch is OFF, and the brakes are set before you crawl under the carrier.
CAUTION:	Make sure you keep all covers and plugs tight. This allows cooling air to stay in, and circulate around the power plant compartment.

4. Check the air cleaner element (fig 8). After operation, when the engine seems to lose power, or when the air cleaner indicator stays in the red zone, service the air cleaner. Remove the container (82), take out the element, clean and reinstall it according to TM 9-2300-257-10, page 3-28. In very sandy or dusty conditions, you may have to clean the element at every halt. If the carrier is equipped with an air cleaner restriction indicator, you don't have to guess.

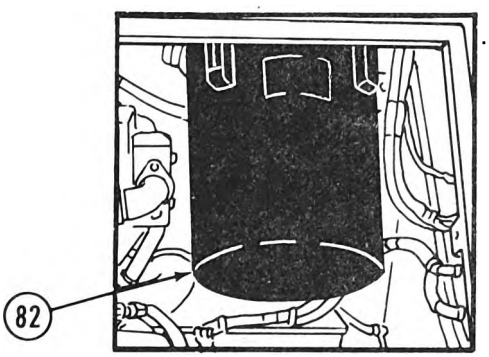

Figure 8. Air cleaner element.

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PERFORMANCE MEASURES (cont)

5. Check the V-belts (figs 9, 10, and 11).

a. Check the generator belt (62), fan drive belts (63), and coolant pump belts (64) for looseness, cracks, and wear. Check the idler (65) for correct adjustment. If the adjuster rod is not between the operating-range marks, report it to organizational maintenance.

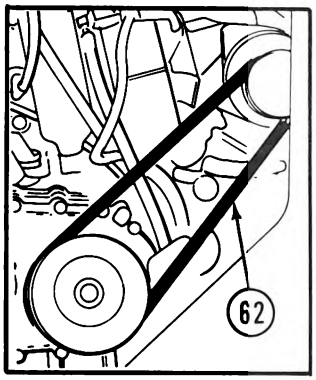

Figure 9. Generator belt.

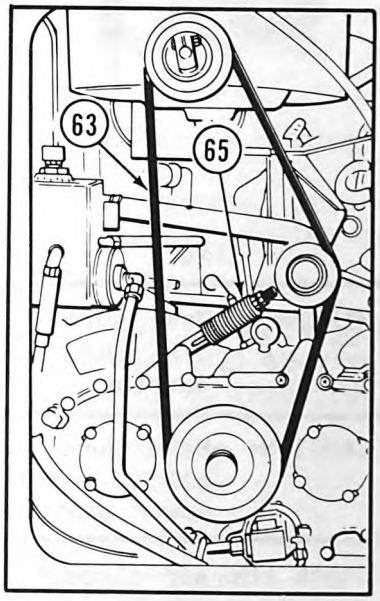

Figure 10. Fan drive and coolant pump belts.

b. Check the coolant pump belt tension (64) by pushing on the belt halfway between the pulleys. If the belt moves more than about 3/8-inch, report it to organizational maintenance.

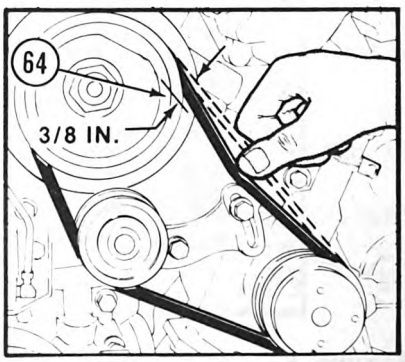

Figure 11. Checking coolant pump belt tension.

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PERFORMANCE MEASURES (cont)

6. Check the engine oil level (fig 12). With the engine operating at normal temperature (160°F to 230°F), stop the engine, wait 5 minutes (see TM 9-2300-257-10, p 2-40), and check the oil level. The dipstick (66) should show oil between L and F. Add oil at the filler (67) as needed (see LO 9-2300-257-12).

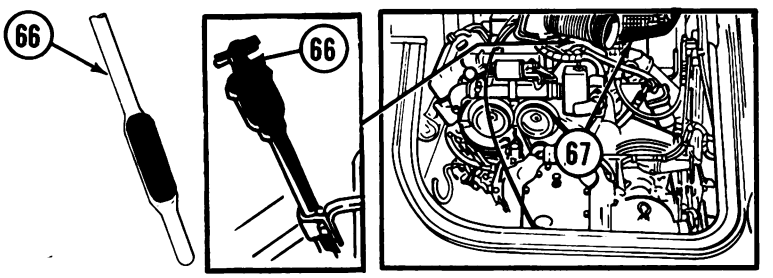

Figure 12. Checking engine oil levels.

CAUTION: 1. Do not overfill.
2. Remove and replace the dipstick slowly, so it will not break.

7. Check the fuel system (fig 13).

   a. Fill the fuel tank allowing 5 inches in the filler neck for expansion.

   b. Make sure the filler screen (76) is clean and in good shape. If the screen needs cleaning out, do it before you fill up.

   c. See that the filler cap (77) is OK and seals properly on the filler neck.

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PERFORMANCE MEASURES (cont)

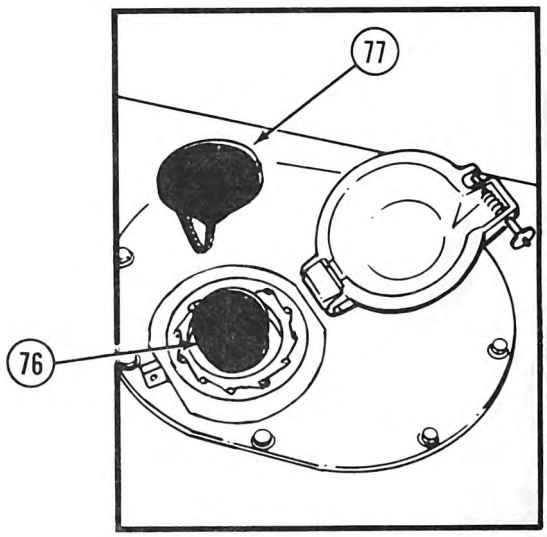

Figure 13. Checking the fuel system.

d. **Drain** any water and deposits out of the primary and secondary **fuel** filters (fig 14).

(1) Put a suitable container under the drain valve (78) at the bottom of the filter.

(2) Open the valve.

(3) Drain until clear fuel runs out.

(4) Then close the valve.

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PERFORMANCE MEASURES (cont)

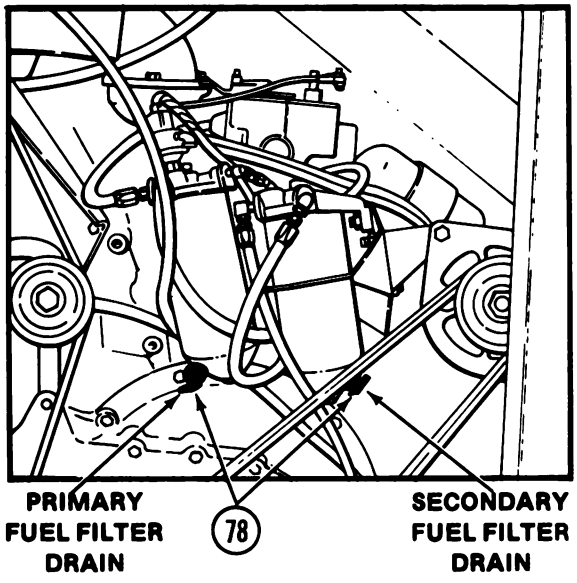

Figure 14. Primary and secondary fuel filter drain.

8. Check the exhaust system (fig 15) for any parts missing, improperly aligned, or insecurely mounted. If you find any of these, report them to organizational maintenance.

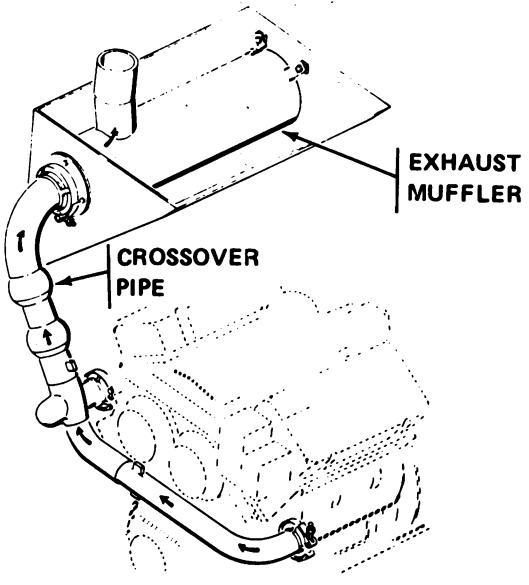

Figure 15. Exhaust system.

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PERFORMANCE MEASURES (cont)

9. Check the lights.

   a. Check the driving lights (68).

   b. Check the headlights on high and low beams. Make sure the high beam indicator light (69) comes on when the headlights are on high beam, and see that the instrument panel lights (70) are working (fig 16).

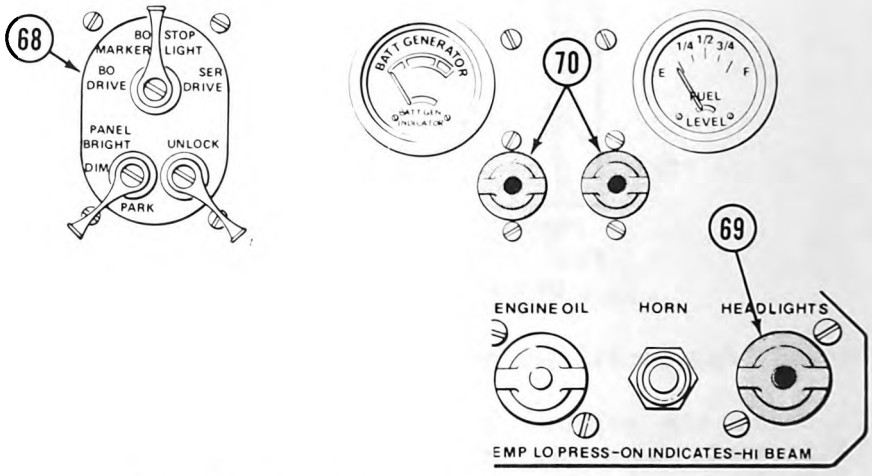

Figure 16. Instrument panel.

WARNING: Do not look directly into the lights.

10. Correct deficiencies noted during the checks and inspections in performance measures 1 through 9 above, that are within the operator's capability.

11. Report all deficiencies not within the operator's capability to correct, to organizational maintenance on DA Form 2404.

12. Make required entries in the equipment historical records on DA Form 2408-1.

REFERENCES

TM 38-750, The Army Maintenance Management System (TAMMS), w/C2, chap 3, pp 3-4 thru 3-8.
TM 9-2300-257-10, Operator's Manual, Carrier, Personnel, Full-Tracked, Armored, M113A1, chap 2, pp 2-42 thru 2-48.

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SELF-RECOVER AN M113A1

CONDITIONS

Given an M113A1 with BII; one extra tow cable; one log, 12 feet long and at least 6 inches in diameter; and two other crew members.

STANDARDS

Recover the vehicle in accordance with the performance measures, without unnecessary damage to the vehicle or injury to personnel.

PERFORMANCE MEASURES

1. To recover an M113A1 using tow cables (for a bellied disablement other than mire):

   a. Connect the tow cables together with a tow hook. Attach the cables to both tracks by passing the ends of the cables through the tracks from the outside and attaching them to the standing parts of the cables with tow hooks.

   b. Gradually apply power to the tracks. The cable will contact the obstacle and anchor the tracks, causing the vehicle to move.

      WARNING: Stop the vehicle before the cables reach the fenders.

2. To recover an M113A1 using a log.

   a. Place the log against both tracks.

   b. Place a tow cable so one end of the cable goes over the log and through the tracks from the inside. Place the other end of the cable under the log, and connect the ends of the cable together with a tow hook on the outside of the track. (Use the same procedure to attach the log to the other track.)

   c. Gradually apply power to the tracks. The slack in the tow cables will be taken up, pulling the log underneath the tracks until it comes in contact with the obstacle. This will anchor the track and cause the vehicle to move.

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TASK SUMMARY 071-333-6523 (cont)

REFERENCES

FM 20-22, Vehicle Recovery Operations, pp 77 thru 81.
TEC 944-171-0019-F, Recovery Operations.

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RECOVER A TRACK VEHICLE BY SIMILAR VEHICLE OR TRACK RECOVERY VEHICLE

CONDITIONS

Given a mired track vehicle and a similar vehicle or recovery vehicle with crew and BII.

STANDARDS

Following the performance measures, recover the vehicle as quickly as possible without unnecessary damage to the vehicle or injury to personnel.

PERFORMANCE MEASURES

1. Determine the amount of recovery effort needed to recover a mired vehicle (table 1).

2. Rig vehicle for recovery.

   a. Rig vehicles with tow bar (if not available, rig with tow cables) so that the recovery vehicle pulls in reverse. Reverse gear provides the greatest gear reduction and affords the driver of the recovery vehicle good visibility of the recovery operation.

   b. When using tow cables, cross them to prevent cables from entangling and to maintain alignment between the vehicles (fig 1).

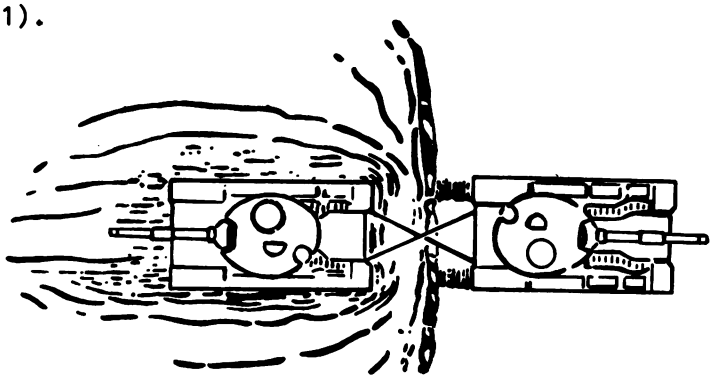

Figure 1. Towing mired tank, using one similar vehicle.

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PERFORMANCE MEASURES (cont)

Table 1. Recovery effort.

Situation	Recovery Effort
Vehicle on solid ground.	One vehicle of equal weight.
Vehicle mired to road wheel depth (fig 2A).	One vehicle of equal weight.
Vehicle mired to fender depth (fig 2B).	Two vehicles of equal weight.
Vehicle mired to turret depth (fig 2C).	Three vehicles of equal weight.
Vehicle will be towed out of mire in the opposite direction from which it entered the mire.	Subtract 10% from recovery effort.
Mired vehicle can apply power to its tracks.	Subtract 40% from recovery effort.

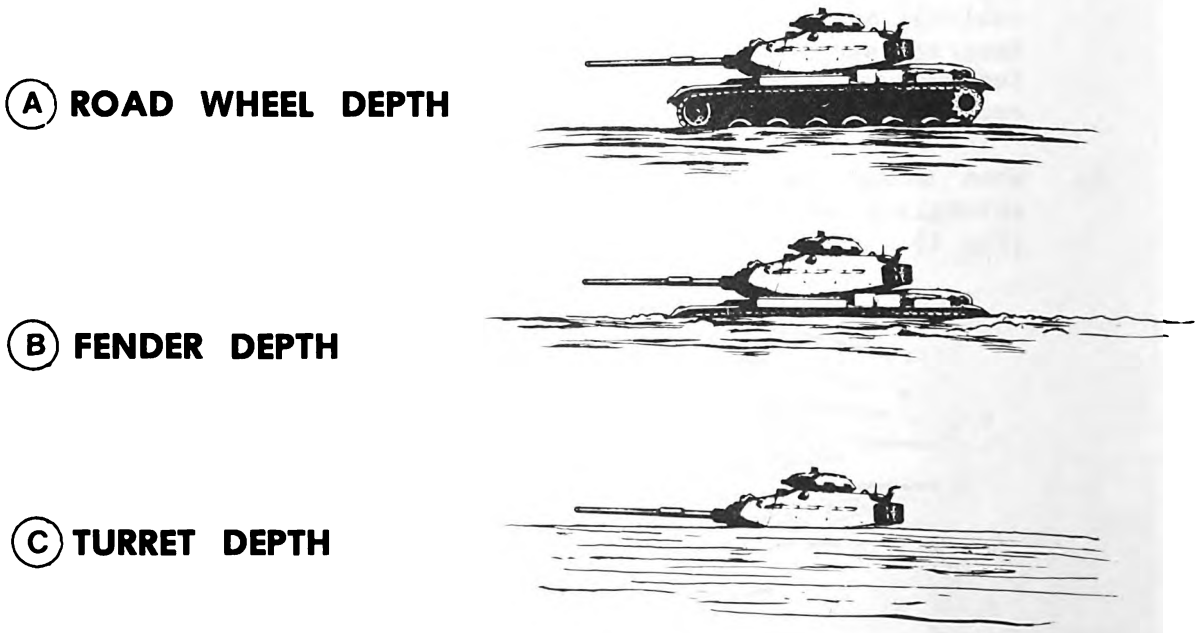

Figure 2.

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PERFORMANCE MEASURES (cont)

c. Tighten the slack in the tow cables by moving the vehicles apart before starting the recovery operation.

d. Check the rigging.

(1) Make sure all locking pins are properly installed on the towing shackles, tow hooks, tow bar, and towing pintle.

(2) Check the condition of the tow bars or cables.

(3) Make sure the towing shackles are not damaged.

e. Position the gun tubes on the side opposite the tow cables or tow bars (fig 1). If three or more vehicles are involved, the center vehicle turns its gun tube to the right or left (fig 3). This will protect the optical sights from a cable whiplashing or gun tubes ramming. (If a cable breaks during recovery, it whiplashes with great force.)

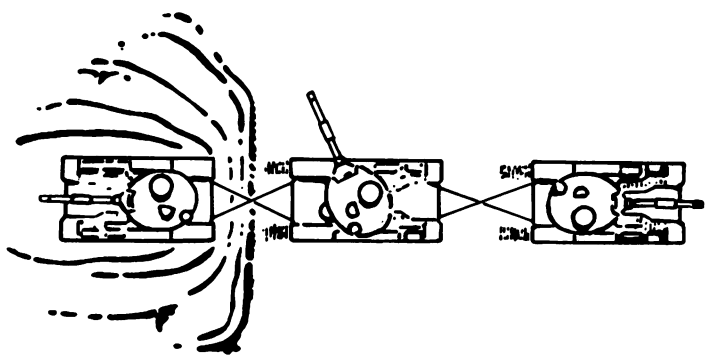

Figure 3. Towing mired tank, using two similar vehicles.

f. Close all driver hatches to protect the drivers from the danger of whiplashing cables.

g. Position the ground guide(s) so the drivers can see him. Have the guide(s) be at least one tow-cable length from the operation for protection from a whiplashing cable.

3. Recover the vehicle.

a. Have all drivers follow the instructions from the ground guide only.

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PERFORMANCE MEASURES (cont)

b. Have all drivers apply power to their tracks simultaneously to pull the vehicle out of the mire on signal from the ground guide.

c. On signal from the ground guide, have all drivers apply their brakes as soon as the mired vehicle comes onto firm ground.

REFERENCES

FM 20-22, Vehicle Recovery Operations, para 6, pp 9 and 10; para 7, pp 10 and 11; para 8, p 12; para 57, pp 67 thru 69; para 58, pp 71 and 72.

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PERFORM PREVENTIVE MAINTENANCE ON OPTICAL EQUIPMENT

CONDITIONS

Given a track vehicle, BII, appropriate cleaning materials and lubricants.

STANDARDS

All optical equipment must be free of grease, dirt, and rust. Cracks, broken parts, or excessive wear must be reported to your supervisor.

PERFORMANCE MEASURES

1. Inspect all components for grease, dirt, foreign matter, rust, corrosion, excessive wear, cracks, or broken parts.

2. Clean metal parts to remove grease or oil; dry thoroughly. Avoid rubber parts (e.g., eyepiece). Apply lubricating oil to polished surfaces.

3. Clean rubber parts with soap and warm water.

4. Brush optical surface lightly with a clean soft brush. To remove oil or grease below 32°F, moisten lens tissue paper with alcohol and clean. When cleaning optical surface above 32°F, use liquid lens-cleaning compound and lens paper.

   a. Do not use polishing liquids, pastes, abrasives, or cleaning cloths for cleaning lenses.
   b. Do not touch the optics. Oil and acid from your fingers will etch the lens; remove fingerprints with soft, clean cloth.
   c. Never expose optics to direct sunlight. Keep the ballistic shields closed over the optics when they are not in use.

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REFERENCES

TM 5-5420-202-10, Operator's Manual for AVLB.
TM 9-2300-257-10, Operator's Manual for M113A1.
TM 9-2350-215-10, Operator's Manual for M60A1, para 3-90 and 3-92, p 3-44.
TM 9-2350-230-20, Operator's manual for M551, table 3-1, pp 3-6 thru 3-33.
TM 9-2350-232-10, Operator's manual for M60A1, para 3-6e, p 3-3.
TM 9-2350-258-10, Operator's manual for M48A5, p 2-27.
TEC 910-171-0014-F, PM--High Density Item--Optical Equipment.

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LUBRICATE A TRACK VEHICLE ACCORDING TO THE LUBRICATION ORDER (LO)

CONDITIONS

Given a track vehicle with BII, operator's manual, lubrication order (LO), and necessary lubricants.

STANDARDS

Within 4 hours, lubricate the vehicle precisely as described in the appropriate LO.

PERFORMANCE MEASURES

Lubricate the track vehicle according to the appropriate LO (see References, below). The LO will specify the proper interval and lubricant to be used.

REFERENCES

TM 5-5420-202-10, Operator's Manual for AVLB.
LO 5-5420-202-12-1, Lubrication Order for AVLB.
LO 9-2300-257-12, Lubrication Order for M113A1.
LO 9-2350-215-12, Lubrication Order for M60A1.
LO 9-2350-230-12, Lubrication Order for M551.
LO 9-2350-232-12, Lubrication Order for M60A2.
LO 9-2350-253-12, Lubrication Order for M60A3.
LO 9-2350-258-12, Lubrication Order for M48A5.

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PERFORM PREVENTIVE MAINTENANCE ON BASIC ISSUE ITEMS (BII)

CONDITIONS

Given a vehicle with BII, rags, cleaning solvent, and a general purpose (PL special) lubrication oil.

STANDARDS

1. You must ensure that:

   a. All BII are free of dirt, grease, and debris.
   b. Blades of cutting tools and other sharp-edged BII are protected.
   c. All BII items are accountable, complete, and stored in the proper place, as directed by the vehicle loading plan.

2. A light coat of oil must be applied to appropriate BII. All cracked, missing, and broken parts, dull edges, and missing equipment which you are not authorized to correct or repair must be reported.

PERFORMANCE MEASURES

Note. Use BII for its intended purpose as described in the operator's manual. For example, a staff section for the 105-mm bore brush is made of light aluminum and is used only to clean the main gun tube. It will be damaged if used as a lever. A crowbar is included in BII for this purpose. Use the right tool for the job.

1. Clean and remove all debris at the end of each maintenance period. Use a brush or wiping rag.

2. Inspect BII for serviceability. Look for cracks, missing parts, broken pieces, or other damage that would make the item unusable.

3. Protect BII from rust. Apply a thin film of oil to all metal surfaces.

4. Protect the wooden parts of BII from drying and cracking.

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PERFORMANCE MEASURES (cont)

a. Store away from direct sunlight and sources of heat.

b. Keep moisture in the wood by applying a thin film of oil.

5. Inspect the blades of cutting tools and other edges on BII to ensure that they remain sharp. Grind or file dull cutting tools until they are sharp.

6. Check all BII for accountability. Compare the BII on the vehicle against the complete BII list in the operator's manual.

7. Stow all BII in their proper place as directed by the operator's manual and the vehicle loading plan.

REFERENCES

TB 750-103, Maintenance and Care of Common-Type Machine Tools and Shop Equipment Before, During, and After Operation, para 7, p 3; para 9 thru 11, pp 3 thru 4.
TM 5-5420-202-10, Operator's Manual for AVLB, app B.
TM 9-243, Use and Care of Handtools and Measuring Tools, para 9, p 4; para 93, p 81; para 98 and 99, pp 86 thru 88; para 104, p 99.
TM 9-2350-215-10, Operator's Manual for M60A1, pp 1-41 thru 1-44, and app B.
TM 9-2350-232-10, Operator's Manual for M60A2, app B.
TM 9-2350-253-10, Operator's Manual for M60A3.
TM 9-2350-258-10, Operator's Manual for M48A5, apps B, C and D.

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PERFORM BEFORE-OPERATION DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES ON A 1/4-TON SERIES VEHICLE

CONDITIONS

Given a 1/4 ton series vehicle, BII, DA Form 2404, DA Form 2408-1, TM 9-2320-218-10, and necessary cleaning equipment.

STANDARDS

1. You must detect:

   a. Loose mounting or damage to the vehicle body, spare tire, towing pintle, windshield hinges and locking pins.
   b. Evidence of fuel, oil, or water leakage.
   c. Cuts, abrasions, and general condition of the tires.
   d. Improper engine oil level.
   e. Loose or missing master cylinder cap.
   f. Improper radiator coolant level.
   g. Indications of exhaust leaks.
   h. Incomplete or unserviceable seat belts and seat locking pins.
   i. Inoperable or broken instruments and incorrect readings on the instruments.
   j. Obstructions in the wire mesh for the cowl panel ventilator.
   k. Dirty fresh air intake for the heater.
   l. Missing snap fasteners and missing straps on the brush guard cover.
   m. Binding of the filler cap fording valve.
   n. Loose brake master cylinder vent.
   o. Improper operation of the tail pipe extension.
   p. Exhaust fumes in the crew compartment.

2. You must correct all deficiencies noted during the checks and services which you are authorized to correct, and report on DA Form 2404 to organizational maintenance those that you are not authorized to correct.

PERFORMANCE MEASURES

1. Perform before-operation checks and services (fig 1) by completing the checks and services outlined in Table 2-1, TM 9-2320-218-10.

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PERFORMANCE MEASURES (cont)

a. Under the column labeled "ITEM NO." (fig 1A), starting with Item 1 and continuing through Item 42, read down the "INTERVAL" column (fig 1B) under the heading "B" (Before) and note all items indicated by a black dot. The black dot will show those items to inspect prior to operation of the vehicle.

b. For those items with a black dot under the "B" heading, proceed across the page to the column labeled "ITEMS TO BE INSPECTED" (fig 1C). This identifies the component/system/area to be inspected.

c. Move across to the column headed "PROCEDURES: CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY" (fig 1D). This will explain how to check/inspect each item in the before operation checks.

d. Finally, proceed to the column "FOR READINESS REPORTING: EQUIPMENT IS NOT READY/AVAILABLE:" (see fig 1E). This column explains what conditions will place the vehicle in a "NOT READY/AVAILABLE" (deadlined) status.

2. Continue the procedures outlined in performance measures 1a thru 1d above and complete all before-operation checks and services.

3. If deficiencies are noted:

a. Correct all deficiencies noted that are within the operator's capability to fix. Operator level actions will include:

(1) Tightening/loosening nuts, bolts, and connections.
(2) Adding fluids.
(3) Adding air to tires.
(4) Servicing and cleaning.

b. Report all deficiencies not within the operator's capability to fix on DA Form 2404 (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records).

Note. When in doubt, notify your supervisor.

4. Make required entries on DA Form 2408-1 (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records).

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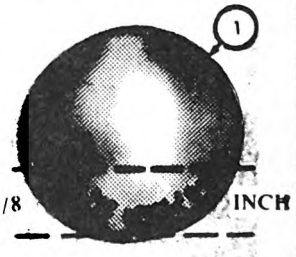
TASK SUMMARY 551-721-1920 (cont)

TABLE 2-1. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS & SERVICES

NOTE: These checks are to be made in the order listed, within designated interval.

B — Before operation
D — During operation
A — After
W — Weekly
M — Monthly (cont.)

Ⓐ ITEM NO.	Ⓑ INTERVAL B	D	A	W	M	Ⓒ ITEMS TO BE INSPECTED	Ⓓ PROCEDURES: CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	Ⓔ FOR READINESS REPORTING, EQUIPMENT IS NOT READY/ AVAILABLE IF:
							NOTE Perform **Weekly** as well as **Before** PMCS's if: *a.* You are the driver but have not operated the vehicle since the last weekly. *b.* You are operating the vehicle for the first time. MAKE THE FOLLOWING WALK-AROUND CHECKS **EXTERIOR OF VEHICLE**	
1	●					EXTERIOR	*a.* Visually check vehicle for security of mounting and damage: *(1)* Vehicle body *(2)* Spare tire mounting *(3)* Towing pintle *(4)* Windshield hinges and locking pins *(5)* Check under vehicle for evidence of fluid (fuel, oil, water leakage) *(6)* Check tires for cuts, abrasions, and general condition  DOESN'T COVER TOP OF "ONE CENT" GOES FOR DX!	Class III leakage evident. Tires have cuts, gouges, or cracks, which would result in mission failure. One or more tires missing or unserviceable (tread depth is ⅛ inch or less). Refer to "one cent" (1).

REFERENCES Figure 1. Extract of Table 2-1, TM 9-2320-218-10.

TM 38-750, The Army Maintenance Management System (TAMMS).
TM 9-2320-218-10, Operator's Manual for M151, Table 2-1, pp 2-9 thru 2-16.

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PERFORM DURING-OPERATION DAILY PREVENTIVE MAINTENANCE CHECKS AND SERVICES ON A 1/4-TON SERIES VEHICLE

CONDITIONS

Given a 1/4-ton series vehicle, BII, DA Form 2404, DA Form 2408-1, TM 9-2320-218-10, and necessary cleaning equipment.

STANDARDS

1. You must detect:

   a. Improper brake pedal free travel and ineffective brakes.
   b. Inoperative or broken instruments; slipping, grabbing or chattering clutch and improper clutch free travel.
   c. Improper operation of the choke, accelerator, throttle control, steering and shifting.
   d. Any unusual noises, dip, sway, or unstable handling.
   e. Binding of latches and deterioration of weather stripping.
   f. Broken or chipped glass.
   g. Exhaust fumes in the passenger/cargo compartment.

2. You must correct all deficiencies noted during the checks and services which you are authorized to correct, and report on DA Form 2404, to organizational maintenance those that you are not authorized to correct.

PERFORMANCE MEASURES

1. Perform during-operation checks and services (see fig 1) by completing the checks and services outlined in Table 2-1, TM 9-2320-218-10.

   a. Under the column labeled "ITEM NO." (see fig 1A), starting with Item 1 and continuing through Item 42, read down the "INTERVAL" column (see fig 1B) under the heading "D" (During) and note all items indicated by a black dot. The black dot will show those items to inspect during the operation of the vehicle.

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PERFORMANCE MEASURES (cont)

b. For those items with a black dot under the "D" heading, proceed across the page to the column labeled "ITEMS TO BE INSPECTED" (see fig 1C). This identifies the component/system/area to be inspected.

c. Move across to the column headed "PROCEDURES: CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY" (see fig 1D). This will explain how to check/inspect each item in the before operation checks.

d. Finally, proceed to the column "FOR READINESS REPORTING: EQUIPMENT IS NOT READY/AVAILABLE IF:" (see fig 1E). This column explains what conditions will place the vehicle in a "NOT READY/AVAILABLE" (deadlined) status.

2. Continue the procedures outlined in performance measures 1a thru 1d above and complete all during-operation checks and services.

3. If deficiencies are noted:

a. Correct all deficiencies noted that are within the operator's capability to fix. Operator level actions will include:

(1) Tightening/loosening nuts, bolts, and connections.
(2) Adding fluids.
(3) Adding air to tires.
(4) Servicing and cleaning.

b. Report all deficiencies not within the operator's capability to fix on DA Form 2404 (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records). If the deficiencies noted cause the vehicle to be "NOT READY/AVAILABLE" (deadlined), notify your supervisor and/or organizational maintenance.

Note. When in doubt, notify your supervisor.

4. Make required entries on DA Form 2408-1 (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records).

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PERFORMANCE MEASURES (cont)

TABLE 2-1. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS & SERVICES

NOTE: These checks are to be made in the order listed, within designated interval.

B — Before operation
D — During operation
A — After
W — Weekly
M — Monthly
(cont.)

Ⓐ ITEM NO.	Ⓑ INTERVAL B	D	A	W	M	Ⓒ ITEMS TO BE INSPECTED	Ⓓ PROCEDURES: CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	Ⓔ FOR READINESS REPORTING, EQUIPMENT IS NOT READY/ AVAILABLE IF:
6	●					RADIATOR	Check radiator coolant level, fill just below bottom of filler neck.	Radiator leaking
7					●		Check radiator for security of mounting.	
8					●	FAN BELTS	Check generator/alternator fan belts for frays, cracks, and serviceability.	Belts missing or belts unserviceable
9					●	GENERATOR/ ALTERNATOR	Check for security of mounting or damage.	
10	●					EXHAUST MANIFOLD	Visually inspect exhaust manifold for carbon deposits indicating exhaust leakage.	Evidence of leaking
11					●	ENGINE COMPONENTS	Check for damage to external engine components. Check all visible lines and fittings for leakage or damage.	Evidence of leaking
							BRAKES	
12		●				SERVICE BRAKES	During operation, observe brake pedal travel in operation and braking operation for effectiveness.	Service brakes not operating properly

Figure 1. Extract of Table 2-1, TM 9-2320-218-10.

REFERENCES

TM 38-750, The Army Maintenance Management System (TAMMS).
TM 9-2320-218-10, Operator's Manual for M151, Table 2-1, pp 2-9 thru 2-16.

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PERFORM WEEKLY/MONTHLY PREVENTIVE MAINTENANCE CHECKS AND SERVICES ON A 1/4-TON SERIES VEHICLE

CONDITIONS

Given a 1/4-ton series vehicle, BII, DA Form 2404, DA Form 2408-1, TM 9-2320-218-10, and necessary cleaning equipment.

STANDARDS

1. You must detect:

   a. Incorrect tire pressure.
   b. Leaking brake master cylinder.
   c. Loose radiator and generator/alternator.
   d. Damage to external engine components and leaking oil, water and fuel lines.
   e. Improperly adjusted brake free travel.
   f. Improperly adjusted hand brake.
   g. Improper electrolyte level in batteries and corrosion on the battery terminals and in the battery box.
   h. Improperly adjusted clutch free travel.
   i. Improperly operating vehicle controls.
   j. Excessive wear and security of "U" joints.
   k. Leaks, damage and security of the shock absorbers.
   l. Cracks, breaks, broken welds and rusted-through condition of the frame and body.

2. You must correct all deficiencies noted during the checks and services which you are authorized to correct, and report on DA Form 2404 to organizational maintenance those that you are not authorized to correct.

PERFORMANCE MEASURES

1. Perform weekly/monthly checks and services (see fig 1) by completing the checks and services outlined in Table 2-1, TM 9-2320-218-10.

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PERFORMANCE MEASURES (cont)

a. Under the column labeled "ITEM NO." (see fig 1A), starting with Item 1 and continuing through Item 42, read down the "INTERVAL" column (see fig 1B) under the heading "W" (weekly) or "M" (monthly) and note all items indicated by a black dot. The black dot will show those items to inspect during weekly/monthly checks and services.

b. For those items with a black dot under the "M" heading, proceed across the page to the column labeled "ITEMS TO BE INSPECTED" (see fig 1C). This identifies the component/system/area to be inspected.

c. Move across to the column headed "PROCEDURES: CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY" (see fig 1D). This will explain how to check/inspect each item in the checks and services.

d. Finally, proceed to the column "FOR READINESS REPORTING: EQUIPMENT IS NOT READY/AVAILABLE IF:" (see fig 1E). This column explains what conditions will place the vehicle in a "NOT READY/AVAILABLE" (Deadlined) status.

2. Continue the procedures outlined in performance measures 1a thru 1d above and complete all weekly/monthly operation checks and services.

3. If deficiencies are noted:

a. Correct all deficiencies noted that are within the operator's capability to fix. Operator level actions will include:

(1) Tightening/loosening nuts, bolts, and connections.
(2) Adding fluids.
(3) Adding air to tires.
(4) Servicing and cleaning.

b. Report all deficiencies not within the operator's capability to fix on DA Form 2404 (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records).

Note. When in doubt, notify your supervisor.

4. Make required entries on DA Form 2408-1 (see Task Summary 171-530-1001, Make Operator's Entries in Organizational Historical Records).

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PERFORMANCE MEASURES (cont)

TABLE 2-1. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS & SERVICES

NOTE: These checks are to be made in the order listed, within designated interval.

B — Before operation
D — During operation
A — After

W — Weekly
M — Monthly (cont.)

(A) ITEM NO.	(B) INTERVAL B	D	A	W	M	(C) ITEMS TO BE INSPECTED	(D) PROCEDURES: CHECK FOR AND HAVE REPAIRED OR ADJUSTED AS NECESSARY	(E) FOR READINESS REPORTING, EQUIPMENT IS NOT READY/ AVAILABLE IF:
							NOTE Perform **Weekly** as well as **Before** PMCS's if: *a.* You are the driver but have not operated the vehicle since the last weekly. *b.* You are operating the vehicle for the first time. MAKE THE FOLLOWING WALK-AROUND CHECKS **EXTERIOR OF VEHICLE**	
1	●					EXTERIOR	*a.* Visually check vehicle for security of mounting and damage: *(1)* Vehicle body *(2)* Spare tire mounting *(3)* Towing pintle *(4)* Windshield hinges and locking pins *(5)* Check under vehicle for evidence of fluid (fuel, oil, water leakage) *(6)* Check tires for cuts, abrasions, and general condition DOESN'T COVER TOP OF "ONE CENT" GOES FOR DX!	Class III leakage evident. Tires have cuts, gouges, or cracks, which would result in mission failure. One or more tires missing or unserviceable (tread depth is ⅛ inch or less). Refer to "one cent" (1).
2				●			Check tires for correct air pressure. Refer to table 1-1 for correct tire pressures	

Figure 1. Extract of table 2-1, TM 9-2320-218-10.

REFERENCES

TM 38-750, The Army Maintenance Management System (TAMMS).
TM 9-2320-218-10, Operator's Manual for M151, Table 2-1, pp 2-9 thru 2-16.

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OPERATE A 1/4-TON SERIES VEHICLE

CONDITIONS

Given a 1/4-ton series vehicle with BII.

STANDARDS

You must operate a 1/4-ton series vehicle following the performance measures described below, without damage to the vehicle or injury to personnel.

PERFORMANCE MEASURES

1. Start the engine.

   WARNING: Carbon monoxide is poisonous. Do not run the vehicle engine in an enclosed area unless it is well ventilated.

   a. Perform before-operation preventive maintenance checks and services (see Task Summary 551-721-1920, Perform Before-Operation Daily Preventive Maintenance Checks and Services on a 1/4-Ton Series Vehicle).

   b. Start the engine (see TM 9-2320-218-10, p 2-28, para 2-10).

   c. Check the instrument panel for normal readings. The oil pressure gage should read 15 psi minimum. The battery generator indicator should read in the green area.

2. Drive on a road.

   a. Set the light switch for stop light operation.

   b. Push in the clutch pedal.

   c. Place the four-wheel drive lever in OUT.

   d. Place the gear shift lever in first gear.

   e. Release the hand brake.

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PERFORMANCE MEASURES (cont)

f. Slowly release the clutch pedal. Depress the accelerator pedal to increase engine speed.

g. As vehicle speed increases, shift through second and third gears to fourth gear.

h. Slow the vehicle by gently pressing on the brake pedal.

WARNING: Drive this vehicle carefully. A full right or left turn at speeds above 20 mph can cause this vehicle to go out of control and turn over.

i. To drive in reverse, bring the vehicle to a complete stop. Push in the clutch and shift the gear lever into reverse gear. Release the clutch pedal slowly.

WARNING: Maximum reverse speed is 9 mph.

k. Perform during-operation maintenance (see Task Summary 551-721-1921, Perform During-Operation Daily Preventive Maintenance Checks and Services on a 1/4-Ton Series Vehicle).

3. Drive over various terrain.

a. To drive over mud, snow, ice, sand, or up steep grades, engage four-wheel drive.

(1) Bring the vehicle to a complete stop.
(2) Push in the clutch pedal.
(3) Place the four-wheel drive lever in.
(4) Place the gear shift lever in first gear.
(5) Drive slowly, do not spin the tires.

b. Lower the tire pressure to drive over mud, snow, ice, or sand (see TM 9-2320-218-10, table 1-1, items H and I, pp 1-5 and 1-6).

c. Install tire chains (if available) to drive over mud, snow, or ice.

d. Perform during-operation maintenance.

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PERFORMANCE MEASURES (cont)

4. Stop the engine.

   a. Release the accelerator pedal and apply the brakes slowly to avoid skidding.

   b. Push the clutch pedal in and shift the transmission gear shift lever into neutral just before the vehicle stops.

   c. Apply the parking brake after the vehicle is stopped.

   d. Turn all switches to the OFF position.

REFERENCES

TM 9-2320-218-10, Operator's Manual: 1/4-Ton Truck, M151, pp 1-1 thru 3-45.

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SELF-RECOVER A 1/4-TON SERIES VEHICLE

CONDITIONS

Given a mired 1/4-ton series vehicle with BII, breaker bars, and ropes.

STANDARDS

Following the performance measures, recover the vehicle as quickly as possible, without unnecessary damage to the vehicle or injury to personnel.

PERFORMANCE MEASURES

1. Self-recover using the field expedient method.

   a. Decrease tire pressure (see TM 9-2310-218-10, table 1-1, items H and I, pp 1-5 and 1-6).

   b. Place vehicle in four-wheel drive operation.

   c. Insert planks, logs, tarpaulins, clothing, etc. beneath and in front of the mired wheels. It may be necessary to dig a hole under the wheels to insert these items. Use a shovel, your hands, or any other convenient item to dig the hole.

   d. Drive in first and reverse gears to gently rock the vehicle backward and forward until the mired wheels rest firmly on the inserted material. Do not spin the wheels. If an assistant is available, have him push from the side of the vehicle.

      WARNING: If you have an assistant, make sure he stands clear of both the front and rear of the vehicle at all times. The vehicle may suddenly lurch forward (or backward) and run over him.

   e. Once the mired wheels are on the material, gently drive forward (or backward) until the vehicle is on firm ground.

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PERFORMANCE MEASURES (cont)

f. Recover any tarpaulins, clothing, shovels, etc. you may have used and stow them on the vehicle before you leave the area.

WARNING: Reinflate tires as soon as possible.

2. Self-recover using the log method.

a. Select a log 6 inches to 1 foot long and 2 inches wide. If a log this size cannot be found, use an empty ammunition container, a wadded up duffle bag, etc.

b. Fasten this item to the mired wheel (fig 1) with tire chains if available. If they are not, use belts, boot laces, duffle bag straps, or chains.

Note. These last items may not work at all. Use them only as a last resort.

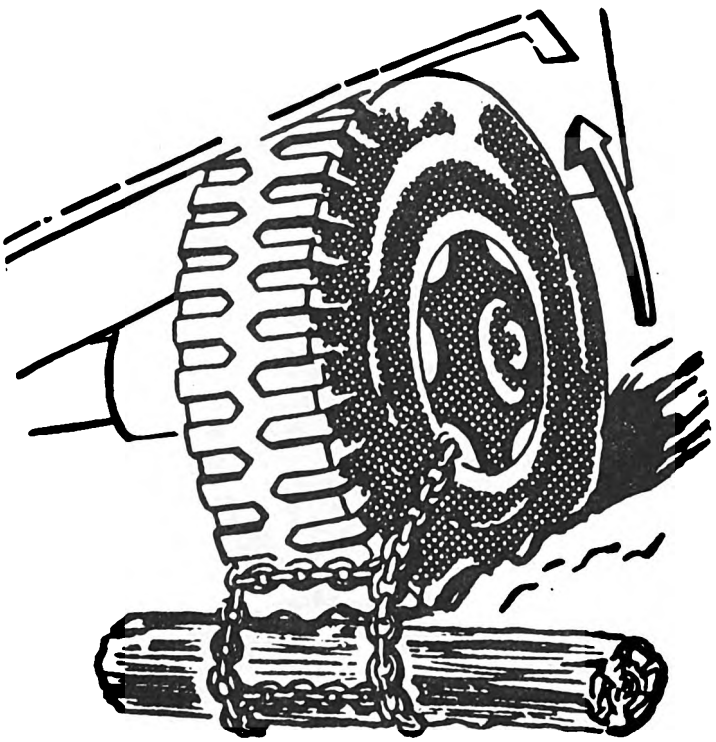

Figure 1. Log method.

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PERFORMANCE MEASURES (cont)

c. Drive the vehicle slowly forward in four-wheel drive. Make sure everyone stands clear of the vehicle.

WARNING: The chains or rope may break, throwing the log out away from the wheels.

d. Stop the vehicle. Check to see if the log will clear the underside of the vehicle. If it will not, unfasten the log and repeat this procedure after the vehicle has moved forward about 1 foot.

e. Unfasten the log. After the vehicle reaches firm ground, recover all items you used and stow them on the vehicle before you leave the area.

3. Self-recover using the rear-wheel winching method.

a. Place a bar (log, breaker bar, screwdriver) through the hole in the end of the axle flange of each rear wheel (see fig 2).

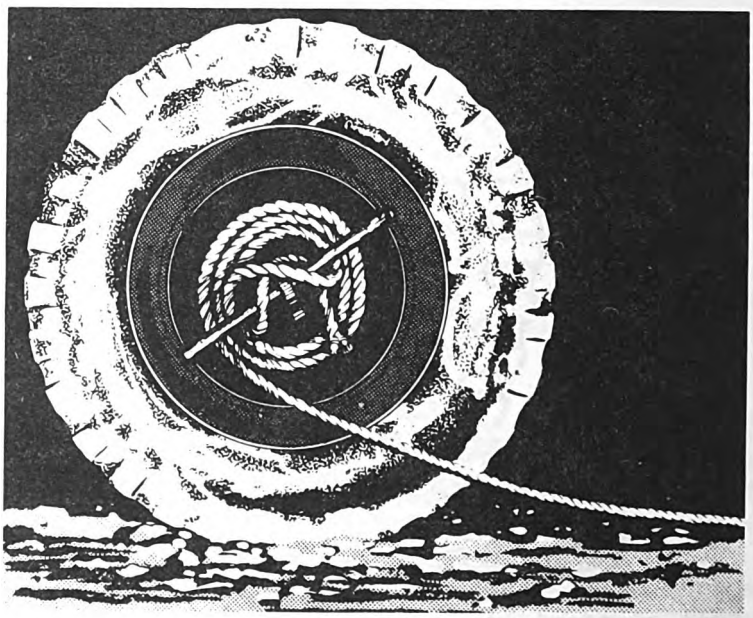

Figure 2. Single-wheel winch.

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PERFORMANCE MEASURES (cont)

b. Fasten one end of the rope to the bar and the other end to an anchor (tree, rock, etc.) for each wheel (fig 2).

c. Move the vehicle in reverse gear. The rope will wind in behind the bar (fig 2). This will pull the vehicle out of the mire.

WARNING: Make sure all personnel stand clear of the vehicle during this operation.

REFERENCES

FM 20-22, Vehicle Recovery Operations, para 62, pp 74 thru 76; para 64, pp 77 thru 83.
TM 9-2320-218-10, Operator's Manual: 1/4-Ton Truck, M151, table 1-1, pp 1-5 and 1-6.
FM 21-305, Manual for the Wheeled Vehicle Driver.

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MAKE OPERATOR'S ENTRIES IN ORGANIZATIONAL HISTORICAL RECORDS

CONDITIONS

Given DA Form 2404, DA Form 2408-1, DA Form 2408-14, TM 38-750, and specific information pertaining to a vehicle.

STANDARDS

You must:

1. Enter the information required on the DA Form 2404 with 100% accuracy.

2. Enter the information required on the DA Form 2408-1 (Equipment Log) with 100% accuracy.

3. Inspect DA Form 2408-14. Make sure all uncorrected faults are entered. Identify incorrect entries and parts that have been on order more than 30 days.

PERFORMANCE MEASURES

1. Fill out the DA Form 2404 (fig 1) and give it to your vehicle commander.

   a. Block 1. Enter the unit designation.
   b. Block 2. Enter the noun nomenclature and model. Example: TANK, COMBAT, FULL TRACKED, M60A1.
   c. Block 3. Enter the serial number of the vehicle.
   d. Blocks 4 and 5. Leave blank if no faults are detected. Enter the date in column c and initial in column e at the end of the daily operations. When faults are detected, enter the miles and hours in blocks 4a and 4b and the date in block 5 (fig 1).
   e. Block 6. Enter DAILY.
   f. Block 7. Enter the TM number and the number of changes (after "w/C"). Record the date of the latest change.
   g. Block 8. Enter your rank and sign your name upon completion of the inspection.

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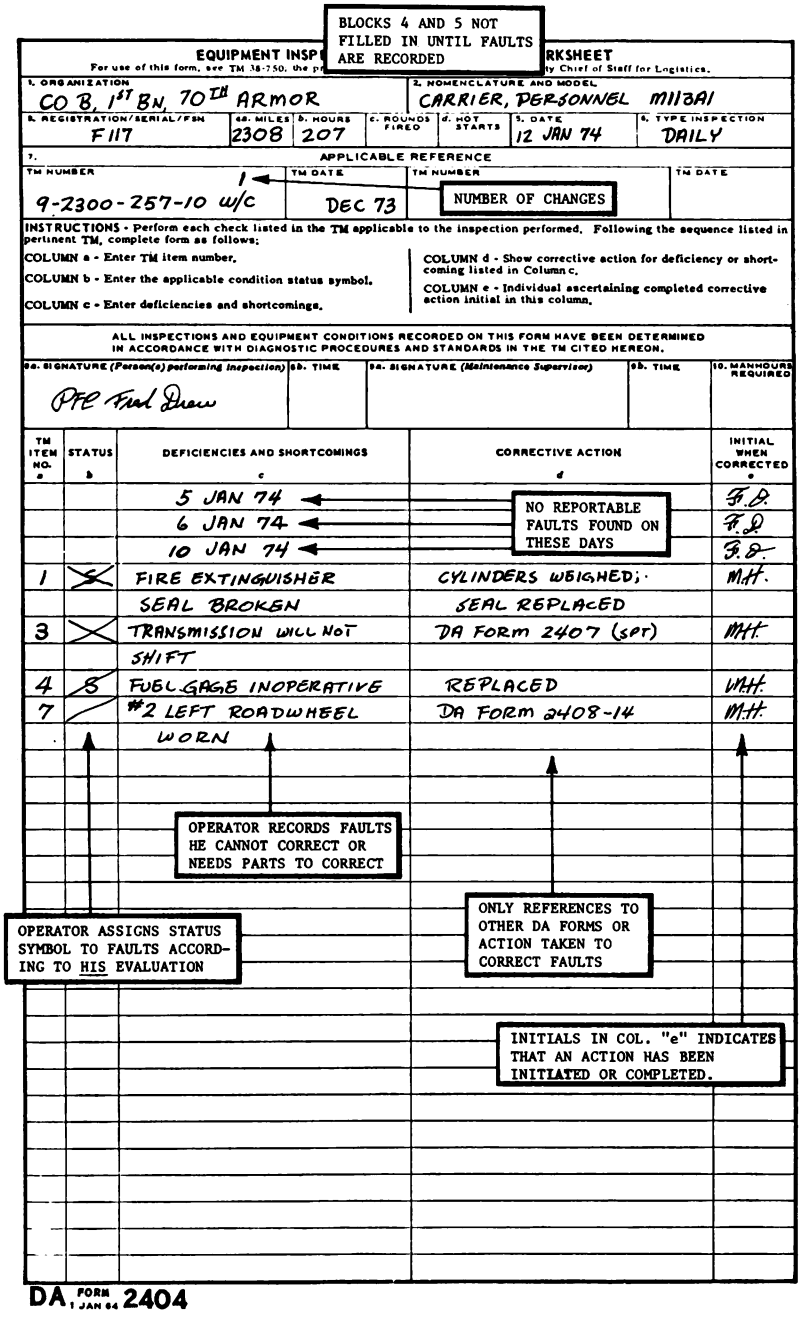
PERFORMANCE MEASURES (cont)



BLOCKS 4 AND 5 NOT FILLED IN UNTIL FAULTS ARE RECORDED

EQUIPMENT INSP[ECTION AND MAINTENANCE] WORKSHEET

For use of this form, see TM 38-750, the pr[oponent agency is] Deputy Chief of Staff for Logistics.

1. ORGANIZATION	2. NOMENCLATURE AND MODEL
CO B, 1ST BN, 70TH ARMOR	CARRIER, PERSONNEL M113A1

3. REGISTRATION/SERIAL/FSN	4a. MILES	4b. HOURS	4c. ROUNDS FIRED	4d. HOT STARTS	5. DATE	6. TYPE INSPECTION
F117	2308	207			12 JAN 74	DAILY

7. APPLICABLE REFERENCE

TM NUMBER	TM DATE	TM NUMBER	TM DATE
9-2300-257-10 w/c 1	DEC 73	NUMBER OF CHANGES	

INSTRUCTIONS - Perform each check listed in the TM applicable to the inspection performed. Following the sequence listed in pertinent TM, complete form as follows:

COLUMN a - Enter TM item number.

COLUMN b - Enter the applicable condition status symbol.

COLUMN c - Enter deficiencies and shortcomings.

COLUMN d - Show corrective action for deficiency or shortcoming listed in Column c.

COLUMN e - Individual ascertaining completed corrective action initial in this column.

ALL INSPECTIONS AND EQUIPMENT CONDITIONS RECORDED ON THIS FORM HAVE BEEN DETERMINED IN ACCORDANCE WITH DIAGNOSTIC PROCEDURES AND STANDARDS IN THE TM CITED HEREON.

8a. SIGNATURE (Person(s) performing inspection)	8b. TIME	9a. SIGNATURE (Maintenance Supervisor)	9b. TIME	10. MANHOURS REQUIRED
PFC Fred Drew				

TM ITEM NO. a	STATUS b	DEFICIENCIES AND SHORTCOMINGS c	CORRECTIVE ACTION d	INITIAL WHEN CORRECTED e
		5 JAN 74	NO REPORTABLE FAULTS FOUND ON THESE DAYS	F.D.
		6 JAN 74		F.D.
		10 JAN 74		F.D.
1	X	FIRE EXTINGUISHER SEAL BROKEN	CYLINDERS WEIGHED; SEAL REPLACED	M.H.
3	X	TRANSMISSION WILL NOT SHIFT	DA FORM 2407 (spr)	M.H.
4	8	FUEL GAGE INOPERATIVE	REPLACED	M.H.
7	/	#2 LEFT ROADWHEEL WORN	DA FORM 2408-14	M.H.

OPERATOR RECORDS FAULTS HE CANNOT CORRECT OR NEEDS PARTS TO CORRECT

OPERATOR ASSIGNS STATUS SYMBOL TO FAULTS ACCORDING TO HIS EVALUATION

ONLY REFERENCES TO OTHER DA FORMS OR ACTION TAKEN TO CORRECT FAULTS

INITIALS IN COL. "e" INDICATES THAT AN ACTION HAS BEEN INITIATED OR COMPLETED.

DA FORM 1 JAN 64 2404

Figure 1. DA Form 2404, "Equipment Inspection and Maintenance Worksheet."

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PERFORMANCE MEASURES (cont)

(1) Column a. Enter the TM item number.
(2) Column b. Enter the status of the noted deficiency:
X - designates inoperative status.
/ - designates operative status, but the fault must be corrected to increase the vehicle's efficiency.
(3) Column c. Enter a description of the uncorrected fault.

2. Fill out DA Form 2408-1, "Equipment Log" (fig 2).

a. Blocks 1 thru 4. The heading will be filled out by your TAMMS clerk.
b. Column a. Enter the calendar date each time the vehicle is operated.
c. Columns b and c. Enter the hour and mileage reading from the tachometer and odometer at the end of operation.

Note. If the odometer is broken, enter the estimated hours and mileage and preface the entry with EST. Example: EST 143.

d. Column d. Enter the amount of fuel (in gallons) that has been added during the period of operation.
e. Column e. Enter the amount of lubricant (in quarts) added during the period of operation. Enter CH when it is changed.
f. Column f. At the conclusion of the before-operation check, enter the appropriate symbol (X, Ⓧ or /) for the most serious fault recorded on the DA Form 2404 or DA Form 2408-14. If the equipment is operational, place a check ( ) in the "Is Equipment Operational" column. If equipment status changes, initial over the check ( ) and enter the appropriate symbol in column f.
g. Column g. Sign your name (as operator) at the end of the period of operation.
h. Columns h thru k. These will be filled out by maintenance personnel.

3. Compare vehicle faults to the DA Form 2408-14, "Uncorrected Fault Record" (fig 3). As the operator, you check this form to determine if all uncorrected faults have been entered. If parts are required, the NSN requisition number and name of the repair part should be entered in columns b and c by the TAMMS clerk. Column f is completed when the fault is corrected. Determine how long the part has been on order. If the part has been on order for more than 30 days, remind your vehicle commander.

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PERFORMANCE MEASURES (cont)

For use of this form, see TM 38-750, the proponent agency is Office of the Deputy Chief of Staff for Logistics.

1. NOMENCLATURE			2. REGISTRATION OR SERIAL NUMBER	3. NEXT SERVICE OR LUBRICATION DUE		
TANK	M60A1		1856	a. TYPE: Q	b. HOURS/MILES: 218/752	c. DATE: 6 FEB 71

4. TYPE LOG: [✓] DAILY [ ] MONTHLY

a. DATE OF ENTRY	b. READING HOURS	c. READING MILES	d. TOTAL FUEL ADDED (Gals)	e. OIL CHANGED OR ADDED (Ch or qts): ENGINE	e. OIL CHANGED OR ADDED (Ch or qts): TRANSMISSION	f. OPERATIONAL STATUS: EQUIPMENT FAULTS	f. OPERATIONAL STATUS: IS EQUIPMENT OPERATIONAL?	g. SIGNATURE OF OPERATOR OR CREW CHIEF	h. SERVICE OR LUB: TYPE	h. SERVICE OR LUB: COMPLETE?	i. OTHER ACTIONS: ENGINE OIL FILTER	i. OTHER ACTIONS: TRANS OIL FILTER	j. NONAVAILABLE DAYS: ORG MAINT S	j. NONAVAILABLE DAYS: ORG MAINT M	j. NONAVAILABLE DAYS: SUPPORT MAINT S	j. NONAVAILABLE DAYS: SUPPORT MAINT M	k. SIGNATURE OF INDIVIDUAL MAKING ENTRIES OTHER THAN OPERATOR OR CREW CHIEF
2 NOV 70	136	1330	(BROUGHT FORWARD FROM PREVIOUS 2408-1)														
2 " "	141	1390	75	12	4	/	✓	C Brown									E. Blair
6 " "	141	1390				X		J May									T Carney
6 " "	143	2		CH	CH	X	✓	C Brown	Q	No	CH	S					T Carney
9 " "	144	7				X		J May									
10 " "	144	7				⊗											J Jones CO
10 " "	150	67	79	8		(X)	✓	C Brown									

Mileage for new odometer

Cleared for limited operation

INSTRUCTIONAL NOTES: 1. The first line entry will indicate "Brought Forward From Previous 2408-1" or "Initial Entry". 2. Entries in column "f" will be made at the conclusion of the before operation check to indicate the status symbol for the most serious uncorrected fault and the operational status of the equipment. 3. The maintenance supervisor's last name initial over the equipment fault status symbol reflects the fault was corrected by maintenance action. 4. Last name initial of the operator or crew chief over (✓) in column "f" indicates a change in the equipment operational status. 5. Status symbol changes are indicated by an entry on the next open line, but may be downgraded only by the CO. Refer para 4-2c(2) (a). When an "X" status symbol is downgraded to a (X) the specific operational limitations will be recorded in the Remarks block. Reference para 4-5d(16) and fig. 4-5.

DA FORM 2408-1, 1 May 67 — REPLACES EDITION OF 1 JAN 64 AND DA FORM 2408-2 1 APR 62, WHICH ARE OBSOLETE. — EQUIPMENT DAILY OR MONTHLY LOG

4. TYPE LOG: [✓] DAILY [ ] MONTHLY

a. DATE OF ENTRY	b. READING HOURS	c. READING MILES	d. TOTAL FUEL ADDED (Gals)	e. OIL CHANGED OR ADDED (Ch or qts): ENGINE	e. OIL CHANGED OR ADDED (Ch or qts): TRANSMISSION	f. OPERATIONAL STATUS: EQUIPMENT FAULTS	f. OPERATIONAL STATUS: IS EQUIPMENT OPERATIONAL?	g. SIGNATURE OF OPERATOR OR CREW CHIEF	h. SERVICE OR LUB: TYPE	h. SERVICE OR LUB: COMPLETE?	i. OTHER ACTIONS: ENGINE OIL FILTER	i. OTHER ACTIONS: TRANS OIL FILTER	j. NONAVAILABLE DAYS: ORG MAINT S	j. NONAVAILABLE DAYS: ORG MAINT M	j. NONAVAILABLE DAYS: SUPPORT MAINT S	j. NONAVAILABLE DAYS: SUPPORT MAINT M	k. SIGNATURE OF INDIVIDUAL MAKING ENTRIES OTHER THAN OPERATOR OR CREW CHIEF
19 Nov 70	190	370	60			⊗	✓	C Brown									T Carney
25 " "	195	425	56	9			✓	J May									
1 DEC 70	195	425		CH	CH	X		C Brown	L	No	CH	S					T Carney
3 " "	200	490	79				✓	C Brown									

INSTRUCTIONAL NOTES: 1. Entries brought forward will not be made on the back of the 2408-1. 2. Monthly "Brought Forward" or "Close Out" entries will not be made on 2408-1 daily. A line may be drawn under the last entry of each month to designate computation was accomplished and transcribed to monthly form.

REMARKS

When limited operation entry is corrected it will be lined out and initialed by the maintenance supervisor.

~~10 NOV 70 LIMITED OPERATIONAL - MAIN ARMAMENT SYSTEM INOPERATIVE~~ SC

Figure 2. DA Form 2408-1, "Equipment Log."

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TASK SUMMARY 171-530-1001 (cont)

PERFORMANCE MEASURES (cont)

1. NOMENCLATURE	2. MODEL	3. SERIAL NUMBER
CARRIER, PERSONNEL	M113A1	F117

STATUS SYMBOL a	FAULT b	REASON FOR DELAY c	DATE (From DA Form 2404 or 2408-13) d	ENTRY APPROVED (Signature) e	DATE (To DA Form 2408-13, 1967, or 2408-13) f
#	RIGHT HEADLIGHT GUARD BENT	DEFERRED UNTIL NEXT "Q" SERVICE	29 MAR 74	M Hoffman	17 APR 74
#	RIGHT HEADLIGHT BROKEN	4088-2005 6240-00-368-4972	29 MAR 74	M Hoffman	17 APR 74
#	CARGO HATCH SEAL TORN	4160-2003 2510-00-767-3152	9 JUN 74	M Hoffman	27 JUN 74
#	TOW CABLE MISSING	4246-2011 4010-00-767-3149	3 SEP 74	M Hoffman	7 SEP 74
#	SEAT CUSHION TORN	4278-2002 2540-00-831-6948	5 OCT 74	M Hoffman	18 OCT 74
#	SPARE TRACK SHOE MISSING	4305-2001 2530-00-930-2011	1 NOV 74	M Hoffman	16 NOV 74
#	TOW HOOKS MISSING (2 EA)	4327-2006 2540-00-679-8035	23 NOV 74	M Hoffman	13 JAN 75
(#)	2 EA HULL DRAIN PLUGS MISSING	5005-2002 4730-00-930-2341	5 JAN 75	M Hoffman	10 JAN 75
/	#2 LEFT ROADWHEEL WORN	5012-2004 2530-00-856-2299	12 JAN 75	M Hoffman	

DA FORM 2408-14, 1 JAN 64 For use of this form, see TM 38-750; proponent agency is Deputy Chief of Staff for Logistics UNCORRECTED FAULT RECORD

Figure 3.

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REFERENCES

TM 38-750, The Army Maintenance Management System (TAMMS), para 3-4, 4-5, and 4-13.
TEC 510-091-6456-F, Prepare DA Form 2404, Equipment Inspection and Maintenance Worksheet.
TEC 510-091-6472-F, Prepare DA Form 2408-1, Equipment Daily or Monthly Log.
TEC 510-091-6474-F, Prepare DA Form 2408-14, Uncorrected Fault Record.

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CHAPTER 2

Section II. COMMON TASKS FOR CAVALRY SCOUTS

SKILL LEVEL 2

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171-896-2001	Conduct a Performance-oriented Training Session	2-785

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ESTABLISH A RADIO NET

CONDITIONS

Given a net control station (NCS), operational radio set, and the net structure of an armor company (including call signs, suffixes, and frequencies extracted from the unit CEOI).

STANDARDS

Within 5 minutes, establish a radio net (you are the NCS).

PERFORMANCE MEASURES

1. Organize the company net structure into alpha-numerical sequence using the abbreviated call sign/suffix. EXAMPLE: 06F (call sign) 26 (suffix) is F26 (abbreviated call sign/suffix).

2. Operate the given radio set (see Task Summaries 113-587-2035, Operate Radio Sets AN/PRC-77, AN/PRC-25, or AN/GRC-160 (Dismounted); 113-587-2033, Operate Radio Set AN/VRC-64; 113-587-2034, Operate Radio Set AN/VRC-46).

3. Transmit the net call sign, followed by net call sign and suffix. (See Task Summary 113-571-1005, Send or Receive a Radiotelephone Message.) EXAMPLE: U4I--THIS IS U4I07--OVER.

   Note. Stations entering the net will respond in alpha-numerical sequence according to their abbreviated call sign/suffix.

   EXAMPLE: First Plt (U5V26) would be V26 (4)
   Second Plt (K2X26) would be X26 (5)
   Third Plt (Y8G26) would be G26 (1)
   CO XO (U4I34) would be I34 (3)
   CO CDR (U4I06) would be I06 (2)

   The stations would respond in the following order:
   U4I07--THIS IS 1) Y8G26 (Third Plt Ldr)
   U4I07--THIS IS 2) U4I06 (Co Commander)
   U4I07--THIS IS 3) U4I34 (Co XO)
   U4I07--THIS IS U5V26 (First Plt Ldr)
   U4I07--THIS IS K2X26 (Second Plt Ldr)

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PERFORMANCE MEASURES (cont)

4. Request each station to authenticate before the next station enters the net.

   EXAMPLE: U4I07--THIS IS Y8G26--OVER.

   Notes. 1. Use of abbreviated call sign/suffix is not required.

   G26--THIS IS I07--AUTHENTICATE AB
   I07--THIS IS G26--I AUTHENTICATE C
   G26--THIS IS I07--PERMISSION TO ENTER NET GRANTED--TIME 1200Z--OUT

   2. If a station has problems in contacting the NCS, after about 15 seconds, the next station in alpha-numerical sequence will contact the NCS.

   3. If the station having problems corrects its problem, it waits until all other stations have completed the net call response and then calls the NCS to request permission to enter the net.

5. Contact the station having radio problems separately and help solve the problem.

   Note. All stations will now use the abbreviated call sign/suffix.

   The NCS suffix is used only by one station in a given net, and then only when establishing a net, or when a station is entering or leaving a net, or when directing tarffic on a net.

1st Plt	2d Plt	3d Plt
U5V	K2X	Y8G
26	26	26

Co XO	NCS	Co Cdr
U4I	U4I	U4I
34	07	06

Figure 1. Sample company radio net.

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REFERENCES

FM 24-18, Field Radio Techniques.
Unit CEOI.

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USE KAL-61B AND KTC 1400 NUMERICAL CODE TO AUTHENTICATE TRANSMISSIONS AND ENCRYPT/DECRYPT NUMBERS AND GRID ZONE LETTERS

CONDITIONS

This task is performed under all weather conditions in a field or a garrison location. Your tank commander will provide you with a CEOI, KAL-61B, KTC 1400 Numerical Code, and paper and pencil as required.

STANDARDS

The task standard has been met when you have authenticated the required transmission and encrypted/decrypted numbers and grid zone letters by use of the KAL-61B and KTC 1400 Numerical Code according to performance measures 1 thru 7 below.

PERFORMANCE MEASURES

1. Set up for encrypting (see fig 1 and CEOI item for Numerical Cipher Authentication System).

   a. Randomly select any two letters (except Z) for message "SET INDICATOR" (SI). EXAMPLE: CP.

   b. Find the first letter "C" of the SI in the LINE INDICATOR COLUMN (1).

   c. Find the second letter "P" of the SI in the line indicated by the first letter. The letter to the right of the second SI letter is the SET LETTER (8).

      Note. If the second SI letter is the last letter in the line, then the first letter in the same line will be the SET LETTER.

   d. Find the SET LETTER "F" in the LINE INDICATOR COLUMN.

   e. Position the READER GUIDE over the line indicated by SET LETTER "F." Device is now ready for encrypting.

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PERFORMANCE MEASURES (cont)

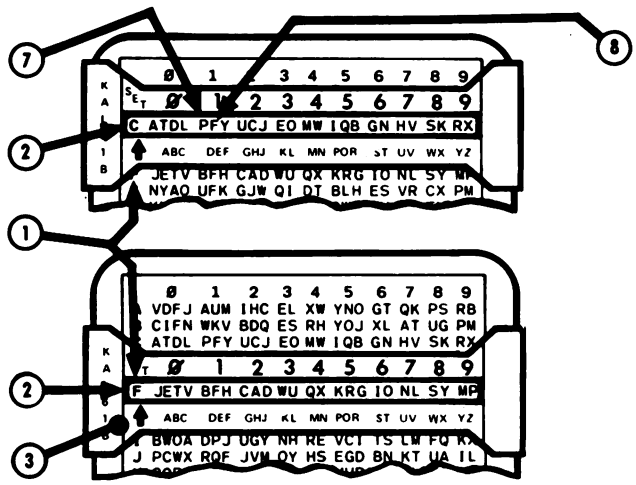
KAL 61 set up for encrypting.
1. Line Indicator Column
2. Set Letter/First Letter of Set Indicator
3. Reader Guide
7. Second Letter of Set Indicator
8. Set Letter

Figure 1. KAL-61B with KTC-1400 Numerical Code.

2. Encrypt numbers (see fig 2 and CEOI Item for Numerical Cipher Authentication System).

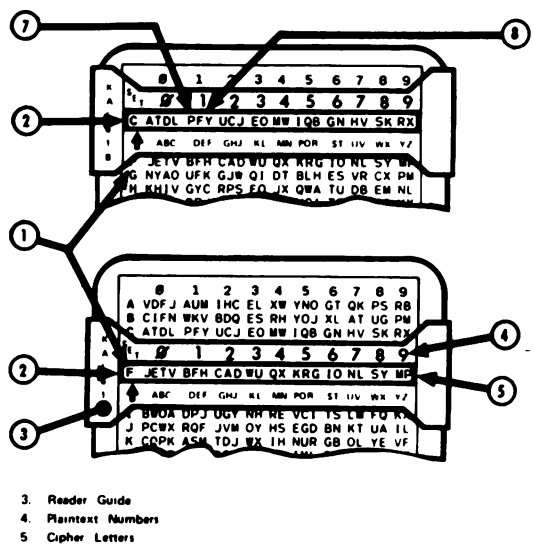

Figure 2. KAL-61B with KTC-1400 numerical code.

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PERFORMANCE MEASURES (cont)

a. Find the number to be encrypted in PLAINTEXT NUMBERS (4) on the READER GUIDE (3). EXAMPLE: 572938.

b. Substitute for each number one of the CIPHER LETTTERS (5) grouped in the set line immediately below the number to be encrypted. Continue to substitute letters from the same set line until all numbers for that group are encrypted. EXAMPLE: RNAMUS is one possibility. By using variants, others are possible.

Note. Numbers will be encrypted one at a time in the same order as they appear in the message. A different cipher letter will be used for repeated numbers. If there are more than 15 numbers to be encrypted in the same message, one SET INDICATOR will be used for the first 15 numbers, and a different SET INDICATOR will be used for each succeeding group of 1 to 15 numbers. This must be done because the encrypting of more than 15 numbers in the same SET INDICATOR can seriously weaken the security of the system.

3. Encrypt grid zone letters (see fig 3 and CEOI Item for Numerical Cipher Authentication).

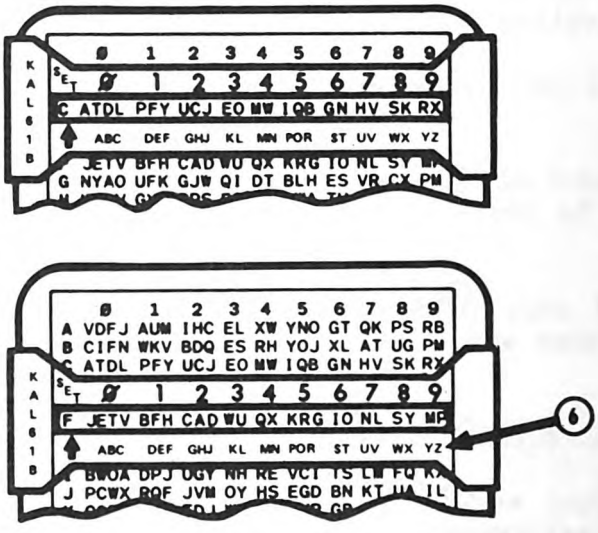
KAL-61B
SET
0 1 2 3 4 5 6 7 8 9
C ATDL PFY UCJ EO MW IQB GN HV SK RX
ABC DEF GHJ KL MN POR ST UV WX YZ
G NYAO UFK GJW QI DT BLH ES VR CX PM
A VDFJ AUM IHC EL XW YNO GT QK PS RB
B CIFN WKV BDQ ES RH YOJ XL AT UG PM
F JETV BFH CAD WU QX KRG IO NL SY MP
J PCWX ROF JVM OY HS EGD BN KT UA IL
6

Figure 3. KAL-61B with KTC-1400 Numerical Code.

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PERFORMANCE MEASURES (cont)

a. Find the first grid zone letter to be encrypted in PLAINTEXT LETTERS (6). EXAMPLE: N.

b. Substitute for that letter the cipher letter located in set line directly above the letter to be encrypted. EXAMPLE: X.

c. Find the second grid zone letter to be encrypted in PLAINTEXT LETTERS (6). EXAMPLE: R.

d. Substitute for the second letter the cipher letter located in set line directly above the letter to be encrypted. EXAMPLE: G. The same set line will be used to encrypt both the grid zone letters and coordinates.

Note. Grid zone letters will be included in messages when they are necessary to the understanding of such messages. NO OTHER LETTERS WILL BE ENCRYPTED. If necessary to preclude misunderstanding, a statement may be made that grid zone letters are included in the message.

4. Complete encryption of grid zone letters and coordinates (see fig 4 and CEOI Item for Numerical Cipher Authentication).

a. This system is designed to be used with plaintext. Therefore, the arrangement and transmission of messages using this system will include both encrypted portions and plaintext portions. The encrypted portions of your message will be arranged as follows:

(1) The first two letters will be the SET INDICATOR letters. (NEVER TRANSMIT THE SET LETTERS.) EXAMPLE: CP. (This is transmitted as "I SET CHARLIE PAPA.")

(2) If grid zone letters are included, the third and fourth letters of your transmission will be encrypted grid zone letters. EXAMPLE: XG. (This is transmitted as "X-RAY GOLF.")

(3) The remaining letters (including the third and fourth if grid zone letters are not included) will be encrypted numbers. EXAMPLE: RNAMUS. (This is transmitted as "ROMEO NOVEMBER ALPHA MIKE UNIFORM SIERRA.")

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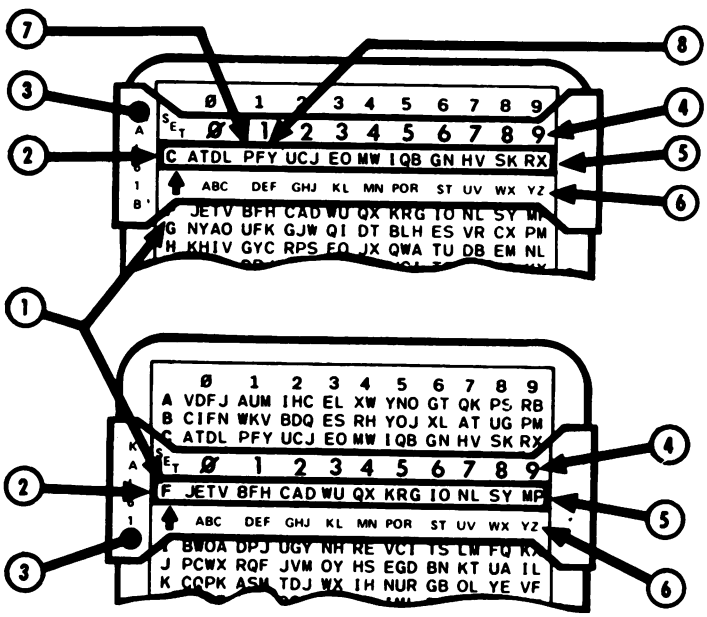
PERFORMANCE MEASURES (cont)

5. Decrypt grid zone letters and numbers (see fig 5 and CEOI Item for Numerical Cipher Authentication).


7
8
3
4
2
5
6
1
Ø 1 2 3 4 5 6 7 8 9
SET Ø 1 2 3 4 5 6 7 8 9
C ATDL PFY UCJ EO MW IQB GN HV SK RX
ABC DEF GHJ KL MN POR ST UV WX YZ
JETV BFH CAD WU QX KRG IO NL SY MP
G NYAO UFK GJW QI DT BLH ES VR CX PM
H KHIV GYC RPS FQ JX QWA TU DB EM NL
Ø 1 2 3 4 5 6 7 8 9
A VDFJ AUM IHC EL XW YNO GT QK PS RB
B CIFN WKV BDQ ES RH YOJ XL AT UG PM
C ATDL PFY UCJ EO MW IQB GN HV SK RX
SET Ø 1 2 3 4 5 6 7 8 9
F JETV BFH CAD WU QX KRG IO NL SY MP
ABC DEF GHJ KL MN POR ST UV WX YZ
J PCWX RQF JVM OY HS EGD BN KT UA IL
K CQPK ASN TDJ WX IH NUR GB OL YE VF

1. Line Indicator Column
2. Set Letter/First Letter of Set Indicator
3. Reader Guide
4. Plaintext Numbers
5. Cipher Letters
6. Plaintext Letters for Grid Zone Designators
7. Second Letter of Set Indicator
8. Set Letter

Figure 5. KAL-61B with KTC-1400 Numerical Code.

a. Example of encrypted location: CP XG RNAMUS.

b. Find the SET LETTER "F" using the SET INDICATOR "CP"" as described in performance measure 1.

c. Decipher the message beginning with the third letter "X" by substituting plaintext letters/numbers on the READER GUIDE (3) for the cipher leters.

6. Authenticate (challenge and reply) (see fig 6 and CEOI Item for Numerical Cipher Authentication).

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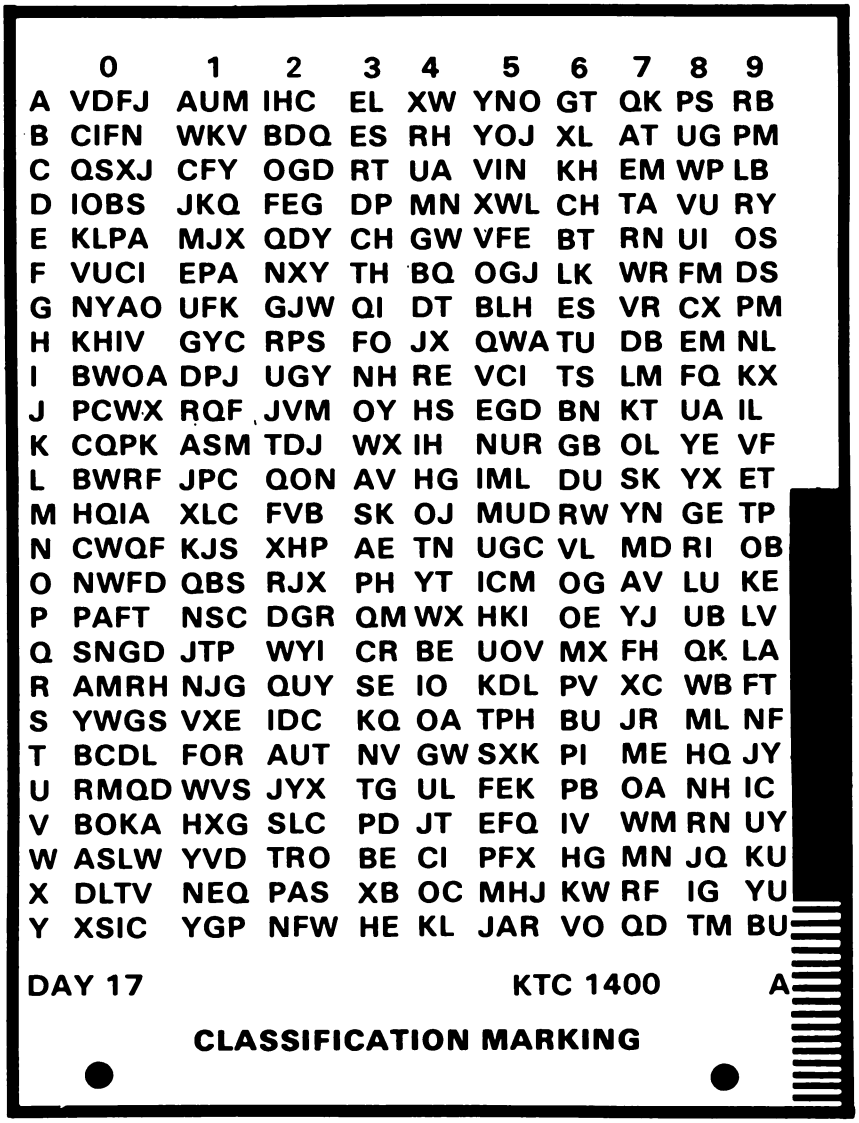
PERFORMANCE MEASURES (cont)



	0	1	2	3	4	5	6	7	8	9
A	VDFJ	AUM	IHC	EL	XW	YNO	GT	QK	PS	RB
B	CIFN	WKV	BDQ	ES	RH	YOJ	XL	AT	UG	PM
C	QSXJ	CFY	OGD	RT	UA	VIN	KH	EM	WP	LB
D	IOBS	JKQ	FEG	DP	MN	XWL	CH	TA	VU	RY
E	KLPA	MJX	QDY	CH	GW	VFE	BT	RN	UI	OS
F	VUCI	EPA	NXY	TH	BQ	OGJ	LK	WR	FM	DS
G	NYAO	UFK	GJW	QI	DT	BLH	ES	VR	CX	PM
H	KHIV	GYC	RPS	FO	JX	QWA	TU	DB	EM	NL
I	BWOA	DPJ	UGY	NH	RE	VCI	TS	LM	FQ	KX
J	PCWX	RQF	JVM	OY	HS	EGD	BN	KT	UA	IL
K	CQPK	ASM	TDJ	WX	IH	NUR	GB	OL	YE	VF
L	BWRF	JPC	QON	AV	HG	IML	DU	SK	YX	ET
M	HQIA	XLC	FVB	SK	OJ	MUD	RW	YN	GE	TP
N	CWQF	KJS	XHP	AE	TN	UGC	VL	MD	RI	OB
O	NWFD	QBS	RJX	PH	YT	ICM	OG	AV	LU	KE
P	PAFT	NSC	DGR	QM	WX	HKI	OE	YJ	UB	LV
Q	SNGD	JTP	WYI	CR	BE	UOV	MX	FH	QK	LA
R	AMRH	NJG	QUY	SE	IO	KDL	PV	XC	WB	FT
S	YWGS	VXE	IDC	KQ	OA	TPH	BU	JR	ML	NF
T	BCDL	FOR	AUT	NV	GW	SXK	PI	ME	HQ	JY
U	RMQD	WVS	JYX	TG	UL	FEK	PB	OA	NH	IC
V	BOKA	HXG	SLC	PD	JT	EFQ	IV	WM	RN	UY
W	ASLW	YVD	TRO	BE	CI	PFX	HG	MN	JQ	KU
X	DLTV	NEQ	PAS	XB	OC	MHJ	KW	RF	IG	YU
Y	XSIC	YGP	NFW	HE	KL	JAR	VO	QD	TM	BU

DAY 17 KTC 1400 A

CLASSIFICATION MARKING

Figure 6. Authentication Page Day 17 of KTC-1400.

a. Authentication will be best accomplished by moving the reader guide completely out of the way or else positioning it so as not to obscure the reply line.

b. Select any two letters (except Z) at random for challenge. EXAMPLE: KV.

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PERFORMANCE MEASURES (cont)

c. Find the first letter "K" of challenge in LINE INDICATOR COLUMN.

d. Find the second letter "V" of challenge in the line indicated by the first letter. The correct reply is the cipher letter directly under the second letter "V" of the challenge.

Notes. 1. If the first letter of the challenge is "Y" indicating the last line of the table, the reply should be taken from the "A" line and will be the letter in the same position as the second letter of the challenge in the "Y" line. If the challenged party does not answer/reply within 5 seconds, but does reply correctly, challenge that party again using a different challenge.

2. The called party will take the first challenge. Both the person making the challenge and the person beign challenged must find the correct reply. The party making the call may then counter-challenge the called party using a different challenge.

7. Transmission authentication (see fig 7 and CEOI Item for Numerical Cipher Authentication System).

a. One hundred transmission authentication digraphs have been provided in this system.

b. Digraphs are to be used in cases where authentication is required and it is not possible or desirable that the receiving station reply.

c. The transmission authentication table consists of 10 numbered columns containing 10 digraphs each. Columns have been numbered to make the assignment of transmission authentication digraphs easier.

d. Numbered columns should be assigned by the controlling authority to selected communications nets within his cryptonet.

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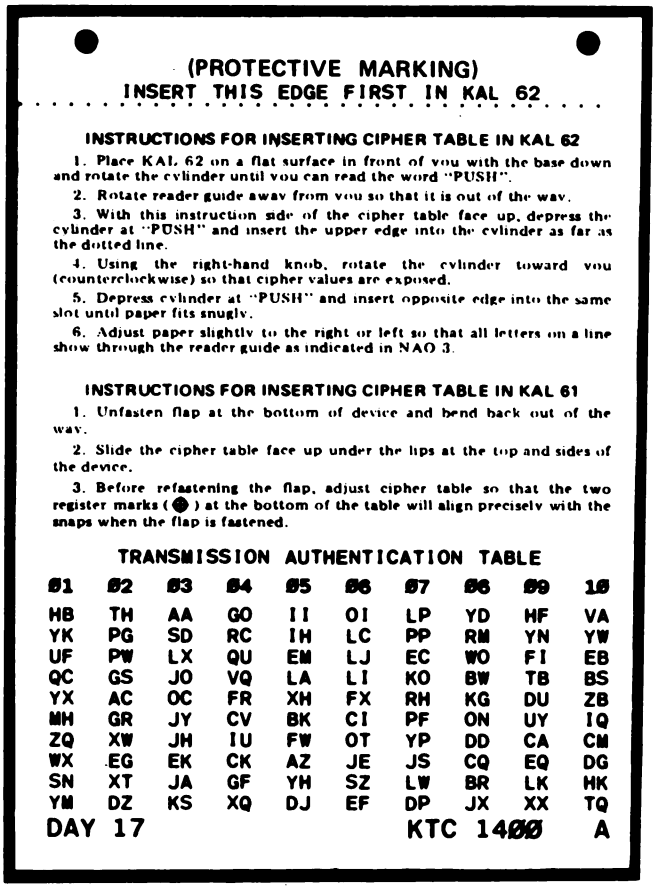
PERFORMANCE MEASURES (cont)



(PROTECTIVE MARKING)

INSERT THIS EDGE FIRST IN KAL 62

INSTRUCTIONS FOR INSERTING CIPHER TABLE IN KAL 62

1. Place KAL 62 on a flat surface in front of you with the base down and rotate the cylinder until you can read the word "PUSH".
2. Rotate reader guide away from you so that it is out of the way.
3. With this instruction side of the cipher table face up, depress the cylinder at "PUSH" and insert the upper edge into the cylinder as far as the dotted line.
4. Using the right-hand knob, rotate the cylinder toward you (counterclockwise) so that cipher values are exposed.
5. Depress cylinder at "PUSH" and insert opposite edge into the same slot until paper fits snugly.
6. Adjust paper slightly to the right or left so that all letters on a line show through the reader guide as indicated in NAO 3.

INSTRUCTIONS FOR INSERTING CIPHER TABLE IN KAL 61

1. Unfasten flap at the bottom of device and bend back out of the way.
2. Slide the cipher table face up under the lips at the top and sides of the device.
3. Before refastening the flap, adjust cipher table so that the two register marks (●) at the bottom of the table will align precisely with the snaps when the flap is fastened.

TRANSMISSION AUTHENTICATION TABLE

01	02	03	04	05	06	07	08	09	10
HB	TH	AA	GO	II	OI	LP	YD	HF	VA
YK	PG	SD	RC	IH	LC	PP	RM	YN	YW
UF	PW	LX	QU	EM	LJ	EC	WO	FI	EB
QC	GS	JO	VQ	LA	LI	KO	BW	TB	BS
YX	AC	OC	FR	XH	FX	RH	KG	DU	ZB
MH	GR	JY	CV	BK	CI	PF	ON	UY	IQ
ZQ	XW	JH	IU	FW	OT	YP	DD	CA	CM
WX	EG	EK	CK	AZ	JE	JS	CQ	EQ	DG
SN	XT	JA	GF	YH	SZ	LW	BR	LK	HK
YM	DZ	KS	XQ	DJ	EF	DP	JX	XX	TQ

DAY 17 KTC 1400 A

Figure 7. Transmission authentication table of KTC-1400.

e. Authentication digraphs within the numbered columns should be used only once and only within the controlling authority's net.

f. When it becomes necessary to use transmission authentication, the first or next unused digraph in the assigned column will be used.

Note. Never self-authenticate using the KTC-1400. If self-authentication is required, use one of the two-letter digraphs found in the transmission authentication table assigned to your unit.

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REFERENCES

Communications-Electronics Operation Instructions (CEOI).

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USE AN AUTOMATED CEOI

CONDITIONS

This task is performed under all weather conditions in a field or garrison location. Your tank commander will provide you with an automated CEOI, scratch paper, and a pencil.

STANDARDS

The task standard has been met when, in 5 minutes, you have used the automated CEOI to determine your call sign, operating frequency, and suffix item number identifier, and you have entered a net in which you do not normally operate in accordance with performance measures 1 thru 5 below.

PERFORMANCE MEASURES

1. Determine call signs.

    a. To find the call signs for a given element, turn to the index (fig 1A) of the CEOI. Follow the left-hand column of items until you find the unit you are looking for.

        EXAMPLE: 1-77 INF BN, A CO, 1ST PLT. After finding the unit, look in the right-hand column under ITEM NO heading to find the correct page and turn to that page (fig 4A).

    b. Determine the correct time period (01) and look under the column for that time period. After finding the call sign for that unit (call sign for 1ST PLAT, A CO, 1-77 INF BN is J1M), go back to the index (fig 1A) and find the ITEM NO for SUFFIXES. Turn to that item number (fig 2A) and find PLT/SEC/TEAM LDR. Located to the left of PLT/SEC/TEAM is the two-digit suffix for PLT/SEC/TEAM LDR. You now have the five-character call sign for the PLT LDR of the 1ST PLAT, A CO, 1-77 INF BN (J1M13).

2. Determine operating frequency.

    a. Frequencies are assigned to each radio net according to command echelon.

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PERFORMANCE MEASURES (cont)

b. To find the frequency for a given net, turn to the index (fig 1) of the CEOI and find the organization you wish to communicate with.

EXAMPLE: A CO, 1ST PLT, 1-77 INF BN. Turn to that item number (fig 4B). Look under the left-hand column until you find the unit you want to communicate with (A CO, 1ST PLT, 1-77 INF BN). After finding the unit, look to the right under the correct time period (Day Ø1). The frequency for A CO, 1ST PLT, 1-77 INF BN is 52.450 MHz.

3. Determine ITEM NUMBER IDENTIFIERS.

a. Unknown station call signs can be identified by use of the ITEM NUMBER IDENTIFIER.

b. Each station should know the two-letter identifier for its own net for each time period. To find your ITEM NUMBER IDENTIFIER, follow these steps:

STEP 1: Go to the index of your CEOI (fig 1B) and find ITEM NUMBER IDENTIFIER and the page where it is located in the CEOI.

STEP 2: Turn to the correct page for identifiers in your CEOI (fig 7) and read down the appropriate time period column until you find your CEOI item number. Then follow that line to the far left column of two-letter identifiers. This is your item number identifier for that time period. You will use this identifier when entering a net in which you do not normally communicate. When you enter such a net, you will be asked by the NCS to identify your station by referring to the item number identifier. Send this two-letter identifier. This provides the NCS of the other net with your CEOI item number, and by referring to that item, the NCS can readily identify your station.

4. Enter a net in which you do not normally operate.

a. When entering a net in which you do not normally operate, use the following procedures:

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PERFORMANCE MEASURES (cont)

SITUATION: You are the driver/radio operator for the CDR, B CO, 1-77 INF BN, with a requirement to enter the 1-79 INF BN CMD net, a net in which your commander does not normally communicate, and send a message to the CDR, CO B. (Time period is Ø1, first day of the month.) The 1-79 INF BN call sign is C3056 (fig 5 and fig 2A) and your CDR is Y6Y75 (fig 4A and fig 2B).

STEP 1: Go to the index of your CEOI (fig 1B) and find the item number identifier page, turn to that page (fig 77), and determine your two-letter identifier (AB).

STEP 2: Determine the operating frequency of the NCS of the 1-79 INF BN as described in performance measure 2 and call the NCS station:

EXAMPLE: CHARLIE THREE OSCAR FIVE SIX--(THIS IS) YANKEE SIX YANKEE SEVEN FIVE--REFER TO ALPHA BRAVO--I HAVE TRAFFIC FOR VICTOR ZERO CHARLIE SEVEN FIVE--REQUEST PERMISSION TO ENTER NET--OVER

Note. Before transmitting, monitor the frequency to make sure you do not cut in on someone else's transmission.

STEP 3: The NCS will require you to authenticate prior to giving you permission to enter the net. Refer to the explanation of correct authentication procedures in Task Summary 113-573-4002, Use KAL-61B and KTC 1400 Numerical Code to Authenticate Transmissions and Encrypt/Decrypt Numbers and Grid Zone Letters. After permission is granted to enter the net, contact the station for which you have traffic, and send your message.

b. Upon completion of your message, advise the NCS that you are leaving his net. You may or may not be required to authenticate your departure.

5. Determine identification of an unknown station. To determine the identification of an unknown station, by use of item number identifiers, use the following procedure:

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PERFORMANCE MEASURES (cont)

SITUATION: You have just received a call from an unknown station. The individual identified himself by utilizing his call sign of A8C69 and stated that his item number identifier is AB. It is the second day of the month (Ø2) and the individual authenticated correctly when you challenged him. To find out who the individual is, perform the following steps:

STEP 1: Go to your CEOI index (fig 1) and locate the page of ITEM NUMBER IDENTIFIERS. Turn to that page (fig 7), then look down the left-hand column until you find the two-letter item number identifier (AB), follow this column across to time period Ø2, this will give you the correct CEOI item number of the unknown unit (1ØB).

STEP 2: Turn to the CEOI item number page for the station calling (1ØB) (fig 6). Look under the correct day (Ø2) for the first three characters of the unknown call sign (A8C). You find this then to be the 52 S&T BN.

STEP 3: To determine who in the 52 S&T BN is calling you, look at the last two characters of the call sign (69). Go to the CEOI item for SUFFIXES, day Ø2 (fig 3), read down the left-hand column until you find the last two characters. You can now determine the identity of the unknown station to be G2/S2 of the 52 S&T BN.

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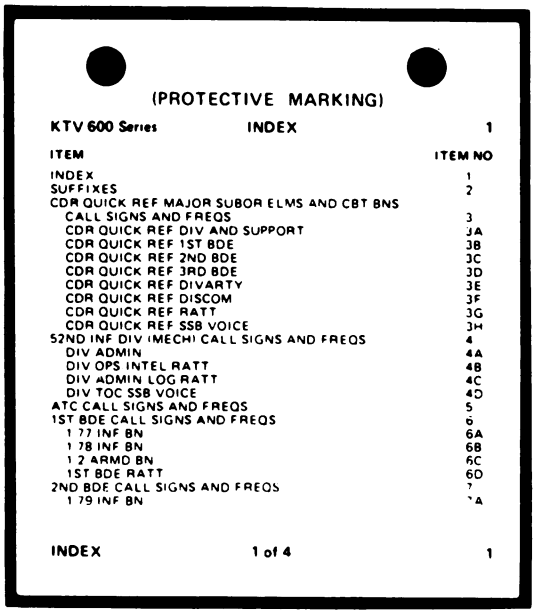
PERFORMANCE MEASURES (cont)



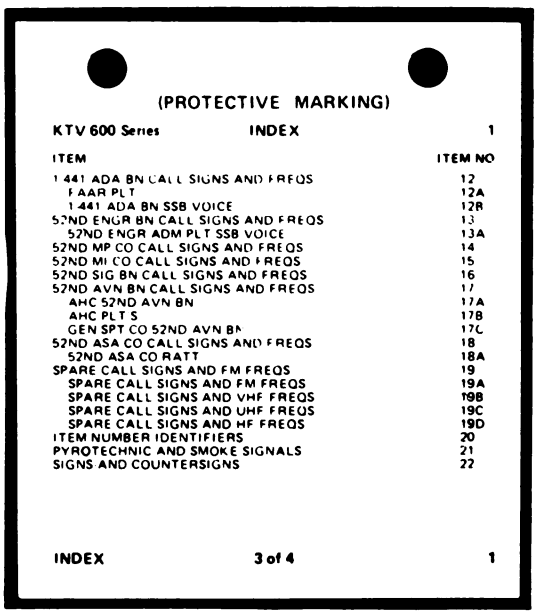
(PROTECTIVE MARKING)

KTV 600 Series INDEX 1

ITEM	ITEM NO
INDEX	1
SUFFIXES	2
CDR QUICK REF MAJOR SUBOR ELMS AND CBT BNS CALL SIGNS AND FREQS	3
CDR QUICK REF DIV AND SUPPORT	3A
CDR QUICK REF 1ST BDE	3B
CDR QUICK REF 2ND BDE	3C
CDR QUICK REF 3RD BDE	3D
CDR QUICK REF DIVARTY	3E
CDR QUICK REF DISCOM	3F
CDR QUICK REF RATT	3G
CDR QUICK REF SSB VOICE	3H
52ND INF DIV (MECH) CALL SIGNS AND FREQS	4
DIV ADMIN	4A
DIV OPS INTEL RATT	4B
DIV ADMIN LOG RATT	4C
DIV TOC SSB VOICE	4D
ATC CALL SIGNS AND FREQS	5
1ST BDE CALL SIGNS AND FREQS	6
1 77 INF BN	6A
1 78 INF BN	6B
1 2 ARMD BN	6C
1ST BDE RATT	6D
2ND BDE CALL SIGNS AND FREQS	7
1 79 INF BN	7A

INDEX 1 of 4 1

A



(PROTECTIVE MARKING)

KTV 600 Series INDEX 1

ITEM	ITEM NO
1 441 ADA BN CALL SIGNS AND FREQS	12
FAAR PLT	12A
1 441 ADA BN SSB VOICE	12B
52ND ENGR BN CALL SIGNS AND FREQS	13
52ND ENGR ADM PLT SSB VOICE	13A
52ND MP CO CALL SIGNS AND FREQS	14
52ND MI CO CALL SIGNS AND FREQS	15
52ND SIG BN CALL SIGNS AND FREQS	16
52ND AVN BN CALL SIGNS AND FREQS	17
AHC 52ND AVN BN	17A
AHC PLT S	17B
GEN SPT CO 52ND AVN BN	17C
52ND ASA CO CALL SIGNS AND FREQS	18
52ND ASA CO RATT	18A
SPARE CALL SIGNS AND FM FREQS	19
SPARE CALL SIGNS AND FM FREQS	19A
SPARE CALL SIGNS AND VHF FREQS	19B
SPARE CALL SIGNS AND UHF FREQS	19C
SPARE CALL SIGNS AND HF FREQS	19D
ITEM NUMBER IDENTIFIERS	20
PYROTECHNIC AND SMOKE SIGNALS	21
SIGNS AND COUNTERSIGNS	22

INDEX 3 of 4 1

B

Figure 1. Sample CEOI page KTV-600 series.

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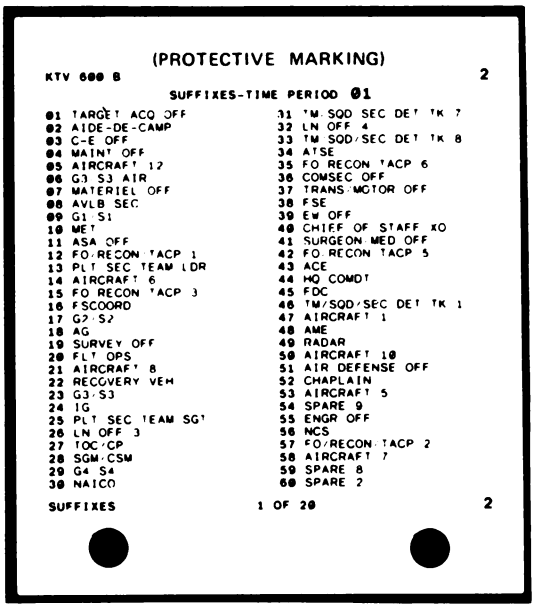
PERFORMANCE MEASURES (cont)



(PROTECTIVE MARKING)

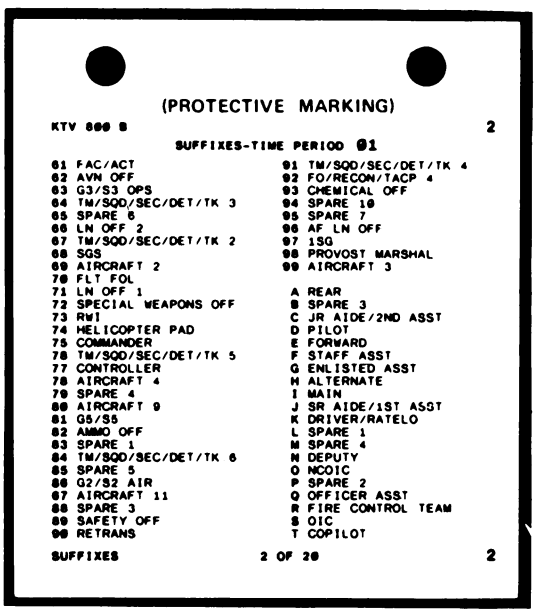
KTV 600 B 2

SUFFIXES-TIME PERIOD 01

01 TARGET ACQ OFF	31 TM SQD SEC DET TK 7
02 AIDE-DE-CAMP	32 LN OFF 4
03 C-E OFF	33 TM SQD/SEC DET TK 8
04 MAINT OFF	34 ATSE
05 AIRCRAFT 12	35 FO RECON TACP 6
06 G3 S3 AIR	36 COMSEC OFF
07 MATERIEL OFF	37 TRANS MOTOR OFF
08 AVLB SEC	38 FSE
09 G1 S1	39 EW OFF
10 MET	40 CHIEF OF STAFF XO
11 ASA OFF	41 SURGEON MED OFF
12 FO RECON TACP 1	42 FO RECON TACP 5
13 PLT SEC TEAM LDR	43 ACE
14 AIRCRAFT 6	44 HQ COMDT
15 FO RECON TACP 3	45 FDC
16 FSCOORD	46 TM/SQD/SEC DET TK 1
17 G2 S2	47 AIRCRAFT 1
18 AG	48 AME
19 SURVEY OFF	49 RADAR
20 FLT OPS	50 AIRCRAFT 10
21 AIRCRAFT 8	51 AIR DEFENSE OFF
22 RECOVERY VEH	52 CHAPLAIN
23 G3 S3	53 AIRCRAFT 5
24 IG	54 SPARE 9
25 PLT SEC TEAM SGT	55 ENGR OFF
26 LN OFF 3	56 NCS
27 TOC CP	57 FO/RECON TACP 2
28 SGM CSM	58 AIRCRAFT 7
29 G4 S4	59 SPARE 8
30 NAICO	60 SPARE 2

SUFFIXES 1 OF 20 2

A



(PROTECTIVE MARKING)

KTV 600 B 2

SUFFIXES-TIME PERIOD 01

61 FAC/ACT	91 TM/SQD/SEC/DET/TK 4
62 AVN OFF	92 FO/RECON/TACP 4
63 G3/S3 OPS	93 CHEMICAL OFF
64 TM/SQD/SEC/DET/TK 3	94 SPARE 10
65 SPARE 6	95 SPARE 7
66 LN OFF 2	96 AF LN OFF
67 TM/SQD/SEC/DET/TK 2	97 ISO
68 SQS	98 PROVOST MARSHAL
69 AIRCRAFT 2	99 AIRCRAFT 3
70 FLT FOL	
71 LN OFF 1	A REAR
72 SPECIAL WEAPONS OFF	B SPARE 3
73 RWI	C JR AIDE/2ND ASST
74 HELICOPTER PAD	D PILOT
75 COMMANDER	E FORWARD
76 TM/SQD/SEC/DET/TK 5	F STAFF ASST
77 CONTROLLER	G ENLISTED ASST
78 AIRCRAFT 4	H ALTERNATE
79 SPARE 4	I MAIN
80 AIRCRAFT 9	J SR AIDE/1ST ASST
81 G5/S5	K DRIVER/RATELO
82 AMMO OFF	L SPARE 1
83 SPARE 1	M SPARE 4
84 TM/SQD/SEC/DET/TK 6	N DEPUTY
85 SPARE 5	O NCOIC
86 G2/S2 AIR	P SPARE 2
87 AIRCRAFT 11	Q OFFICER ASST
88 SPARE 3	R FIRE CONTROL TEAM
89 SAFETY OFF	S OIC
90 RETRANS	T COPILOT

SUFFIXES 2 OF 20 2

B

Figure 2. Sample CEOI page KTV-600 series.

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PERFORMANCE MEASURES (cont)

FOR OFFICIAL USE ONLY

KTV 600 B 2

SUFFIXES-TIME PERIOD 02

01 AIRCRAFT 1	31 FLT OPS
02 MATERIEL OFF	32 RETRANS
03 AIRCRAFT 7	33 SPARE 7
04 ISG	34 SURGEON/MED OFF
05 RECOVERY VEH	35 RADAR
06 TM/SQD/SEC/DET/TK 7	36 G3/S3
07 FO/RECON/TACP 5	37 SPARE 5
08 HELICOPTER PAD	38 FAC/ACT
09 NAICO	39 PLT/SEC/TEAM SGT
10 COMSEC OFF	40 AIR DEFENSE OFF
11 ACE	41 AIRCRAFT 9
12 SPARE 4	42 MAINT OFF
13 FO/RECON/TACP 3	43 G3/S3 AIR
14 HQ COMDT	44 LN OFF 1
15 AIRCRAFT 5	45 PLT/SEC/TEAM LDR
16 AIRCRAFT 8	46 FSCOORD
17 TM/SQD/SEC/DET/TK 1	47 FLT FOL
18 TARGET ACQ OFF	48 PROVOST MARSHAL
19 G1/S1	49 SQM/CSM
20 AVLB SEC	50 FO/RECON/TACP 1
21 CHIEF OF STAFF/XO	51 NCS
22 AIRCRAFT 10	52 EW OFF
23 AIRCRAFT 3	53 TM/SQD/SEC/DET/TK 4
24 AME	54 CONTROLLER
25 FO/RECON/TACP 4	55 CHAPLAIN
26 SPARE 8	56 CHEMICAL OFF
27 AVN OFF	57 TOC/CP
28 FSE	58 IG
29 C-E OFF	59 G3/S3 OPS
30 MET	60 ASA OFF

SUFFIXES 3 OF 20 2

A

(PROTECTIVE MARKING)

KTV 600 B 2

SUFFIXES-TIME PERIOD 02

61 TM/SQD/SEC/DET/TK 3	91 AMMO OFF
62 FDC	92 G2/S2 AIR
63 TRANS/MOTOR OFF	93 AIRCRAFT 6
64 LN OFF 4	94 AG
65 SPARE 6	95 TM/SQD/SEC/DET/TK 6
66 TM/SQD/SEC/DET/TK 8	96 AIRCRAFT 4
67 AIRCRAFT 2	97 SPARE 10
68 LN OFF 2	98 RWI
69 G2/S2	99 AF LN OFF
70 ATSE	
71 SAFETY OFF	A DEPUTY
72 AIRCRAFT 12	B SPARE 2
73 FO/RECON/TACP 6	C JR AIDE/2ND ASST
74 ENGR OFF	D FIRE CONTROL TEAM
75 SPARE 2	E FORWARD
76 COMMANDER	F SPARE 4
77 SPARE 1	G ALTERNATE
78 AIDE-DE-CAMP	H PILOT
79 FO/RECON/TACP 2	I REAR
80 TM/SQD/SEC/DET/TK 5	J SPARE 3
81 LN OFF 3	K COPILOT
82 G5/S5	L STAFF ASST
83 SURVEY OFF	M DRIVER/RATELO
84 TM/SQD/SEC/DET/TK 2	N OIC
85 G4/S4	O SPARE 1
86 SGS	P SR AIDE/1ST ASST
87 SPARE 9	Q NCOIC
88 SPECIAL WEAPONS OFF	R OFFICER ASST
89 SPARE 3	S ENLISTED ASST
90 AIRCRAFT 11	T MAIN

SUFFIXES 4 OF 20 2

B

Figure 3. Sample CEOI page KTV-600 series.

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PERFORMANCE MEASURES (cont)

(PROTECTIVE MARKING)

KTV 600 B — CALL SIGNS — 6A

1-77 INF BN

	01	02	03	04	05
1-77 INF BN	S9A	I2L	P0T	Z1N	I3L
HHC	B7J	G8X	K4H	O3E	K4C
A CO	M1C	R4M	N3X	T1K	K7X
1ST PLT	J1M	K2J	V6N	G8L	F1G
2ND PLT	V7D	R8O	E0P	K2W	W2R
3RD PLT	D2H	W5K	K1J	G5M	D5P
MORTAR PLT	C4B	J2A	P7K	E5Y	F5W
B CO	Y6Y	P0Z	L0Q	K6R	C6J
1ST PLT	P0F	B6R	X1A	P1U	R2N
2ND PLT	S2X	H7H	V8I	Y7C	G2V
3RD PLT	L7T	L7Q	Q7V	S5A	I4Z
MORTAR PLT	R9V	B7W	D1S	P7D	B2B
C CO	G1Q	J6N	E6F	M4B	A0T
1ST PLT	N7O	P9U	B6B	N5V	P7U
2ND PLT	B9S	Y6D	K2R	R7O	I6Y
3RD PLT	H8P	P7I	Z6L	B4Q	T1I
MORTAR PLT	A5L	Q2C	A8E	Y8F	V6D
CSC	C0W	O4B	N7C	O6H	S4H
AT PLT	A2E	N9P	E4W	N2G	L6E
MORTAR PLT	J6Z	U2G	U6G	Q5Z	W0W
RECON PLT	E4G	B6F	R0Z	D0T	E8S
REDEYE SEC	J7I	Z0S	A6O	Q5J	U1K
GND SURVL SEC	G5U	L2Y	T8D	F1I	U4O
MEDEVAC	Q5J	A6I	V2S	W0P	O2O

1-77 INF BN — 6A

A

(PROTECTIVE MARKING)

KTV 600 B — FREQUENCIES — 6A

1-77 INF BN

	01	02	03	04	05
1-77 INF CMD	52 800	61 950	35 050	61 550	68 700
1-77 INF A/L	49 300	64 200	31 500	39 250	41 200
A CO CMD	35 950	48 600	35 550	34 600	38 250
1ST PLT	52 450	52 550	47 900	53 150	51 700
2ND PLT	53 100	52 500	52 050	52 750	50 850
3RD PLT	47 500	53 450	52 350	52 550	52 150
MORTAR PLT	71 450	66 450	59 450	68 050	70 650
B CO CMD	44 850	56 750	71 850	55 200	56 250
1ST PLT	53 350	52 650	50,950	53 350	53 750
2ND PLT	50 150	48 800	53 100	52 350	52 450
3RD PLT	53 650	52 050	53 700	50 950	48 050
MORTAR PLT	49 150	49 050	48 950	71 200	62 550
C CO CMD	56 150	66 850	54 750	49 850	45 550
1ST PLT	50 450	53 100	51 200	52 650	53 250
2ND PLT	52 550	48 100	52 950	53 100	50 650
3RD PLT	51 600	48 700	53 350	53 500	52 100
MORTAR PLT	66 000	55 850	47 950	45 800	43 300
CSC CMD	57 800	34 900	34 250	35 850	61 450
AT PLT	54 650	65 650	35 350	49 300	68 250
MORTAR PLT	46 450	58 900	64 200	61 300	68 550
RECON PLT	71 850	55 900	72 900	39 500	72 550
REDEYE SEC	46 250	36 400	73 000	45 150	75 900
GND SURVL SEC	39 500	41 700	58 200	73 000	47 700
1-77 AJ/ALT 1	53 000	33 350	73 150	56 750	59 800
1-77 AJ/ALT 2	48 050	71 500	59 000	73 300	65 800
MEDEVAC P	35 200	43 800	48 500	69 000	73 150

1-77 INF BN — 6A

B

Figure 4. Sample CEOI page KTV-600 series.

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PERFORMANCE MEASURES (cont)

(PROTECTIVE MARKING)

KTV 600 B — CALL SIGNS — 7A

1-79 INF BN

	01	02	03	04	05
1-79 INF BN	CJO	XØM	XØH	X4E	VØK
HHC	L6S	G3Q	DØU	I2F	C8P
A CO	K8K	Y6L	D1Q	EØJ	I6T
1ST PLT	O9W	B9A	H6T	VØY	U9C
2ND PLT	K5Q	U7F	G3J	P1R	GØH
3RD PLT	Z8F	L4H	P6C	I4Q	Q6Y
MORTAR PLT	Y9Y	B8G	X7B	A2N	V2R
B CO	VØC	G3O	Z5I	HØL	B2Z
1ST PLT	A1B	C2P	Z2K	Y6H	W6I
2ND PLT	Z8J	N8D	F3S	Z8W	Q5W
3RD PLT	FØR	D1T	W5R	V6V	S8L
MORTAR PLT	A6P	L8B	T3X	U5A	L3J
C CO	S8I	S8N	X1E	M9T	X6G
1ST PLT	B1A	F7Y	B8M	U6B	B9B
2ND PLT	M3U	C4S	K2Z	T9U	H7X
3RD PLT	Q5X	U4R	X1L	Y2D	J6Q
MORTAR PLT	H5N	A2E	H8D	H3I	IØM
CSC	M6L	B9X	P9V	D4G	Q8V
AT PLT	M8M	S5V	E2P	H3O	E2O
MORTAR PLT	I8Z	Q3U	X2F	X1K	M8U
RECON PLT	W9V	E2Z	B1Y	Z7Z	O9F
REDEYE SEC	U5T	V9I	C5N	H3X	D7N
GND SURVL SEC	Z9H	Z2C	E2O	C5P	C1S
MEDEVAC	Q5J	A6I	V2S	WØP	O2O

1-79 INF BN — 7A

Figure 5. Sample CEOI page KTV-600 series.

(PROTECTIVE MARKING)

KTV 600 B — CALL SIGNS — 10B

52ND S&T BN

	01	02	03	04	05
52 S&T BN	U4J	A8C	Z8R	R9U	GØX
HHC	L8W	E7E	Z1G	O6A	E6Z
A CO	J7D	R3I	L1S	Q5Y	R9O
1ST PLT	U4Q	X2L	V6B	Y5C	DØH
2ND PLT	L4E	M1B	Q4K	S9W	Z6K
3RD PLT	A4K	O8J	Q3O	H4R	P9F
MAINT SPT PLT	J3R	H7R	N2Z	F6N	X4Q
B CO	V7L	D4P	N9Q	B4G	R3W
1 LT TRK PLT	D4C	R6K	S1H	R9L	IØA
2 LT TRK PLT	Q8I	IØF	R8C	Y9E	J3P
3 LT TRK PLT	M8V	G7Z	S4E	I3F	T3E
MED TRK PLT	P2O	E2V	BØM	UØX	D9U
DISCOM	X3H	P7O	T3A	H4M	L8C
MEDEVAC	Q5J	A6I	V2S	WØP	O2O

52ND S&T BN — 10B

Figure 6. Sample CEOI page KTV-600 series.

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PERFORMANCE MEASURES (cont)

(PROTECTIVE MARKING)

KTV 600 B 20

ITEM NUMBER IDENTIFIERS

	01	02	03	04	05	06	07	08	09	10
AA	19A	3G	19A	13A	11A	7	9B	9F	13	15
AB	6A	10B	9B	9A	12	19B	8C	7A	4	8A
AC	3H	4C	19D	4D	6	3B	19B	14	9F	10D
AD	8	12A	3F	7B	19D	7B	3A	19A	4D	10E
AE	3A	4A	12A	3B	6C	10E	4D	10B	17B	3
AF	3C	10A	3E	10E	9E	8E	6D	16	10D	19D
AG	3E	4D	7	19D	11	16	3E	9C	11A	11
AH	9F	13	10C	19A	15	3D	9D	8E	17A	3E
AI	7	7C	8D	10C	10B	7D	4B	11B	7B	7A
AJ	6	10C	13	6D	13A	9	5	13	7A	8B
AK	18	3D	16	8A	17B	5	3B	3E	8C	6
AL	17	10E	3	5	9A	9A	13	8C	4C	6B
AM	10C	19C	10	9D	8C	8A	10C	7D	19C	11A
AN	12	12	3D	10A	9C	4B	8B	4D	9C	18A
AO	6B	19B	9A	10	12B	10D	10E	5	14	9F
AP	8D	19	19	3D	3D	17B	3H	10E	9	17C
AQ	9	8E	11A	9	9	14	11B	11	3E	19
AR	7D	15	12	6	17A	19C	19C	3F	3F	9B
AS	3G	9E	9	18A	5	11A	18A	18A	17C	3H
AT	7C	7A	17	8D	10D	4D	9F	17A	9A	18
AU	9B	3A	9F	6C	6A	3H	6A	9E	19A	12B
AV	3F	3B	18A	12	3H	4	8A	9D	3D	16
AW	19B	8C	8B	7A	7C	17A	7	15	6D	3C
AX	10A	18A	14	8	17	8C	3F	19D	13A	17A
AY	5	11A	7A	6A	8B	17	10	17	3	4A
AZ	16	17B	4D	12A	3G	3C	3G	17B	19D	7D

ITEM NUMBER IDENTIFIERS 1 OF 3 20

Figure 7. Sample CEOI page KTV-600 series.

REFERENCES

Signal Security Training Packet.

Army Correspondence Course SSO 470, the CEOI.

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INSTALL AND OPERATE HOT-LOOP WIRE COMMUNICATIONS

CONDITIONS

Given a track vehicle with crew, BII, WD-1/TT wire, at least one other track vehicle with crew, and electrical tape.

STANDARDS

You must transmit a message using hot-loop wire communications and receive acknowledgement to that message.

PERFORMANCE MEASURES

1. Install the hot loop using an external phone box (figs 1 and 2).

   a. Separate the WD-1/TT into two separate lines (fig 1).

   b. Strip back the insulation approximately 1 inch from the ends of both wires.

      Note. To prevent the wire from shorting out at a later date, stagger the stripped sections (fig 1).

   c. Double over each stripped section and twist. This will give you a 1/2-inch end to insert into the binding post (fig 1).

   d. Insert one of the twisted ends into one of the line posts. Repeat the process for the other line and other line post (fig 2).

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PERFORMANCE MEASURES (cont)

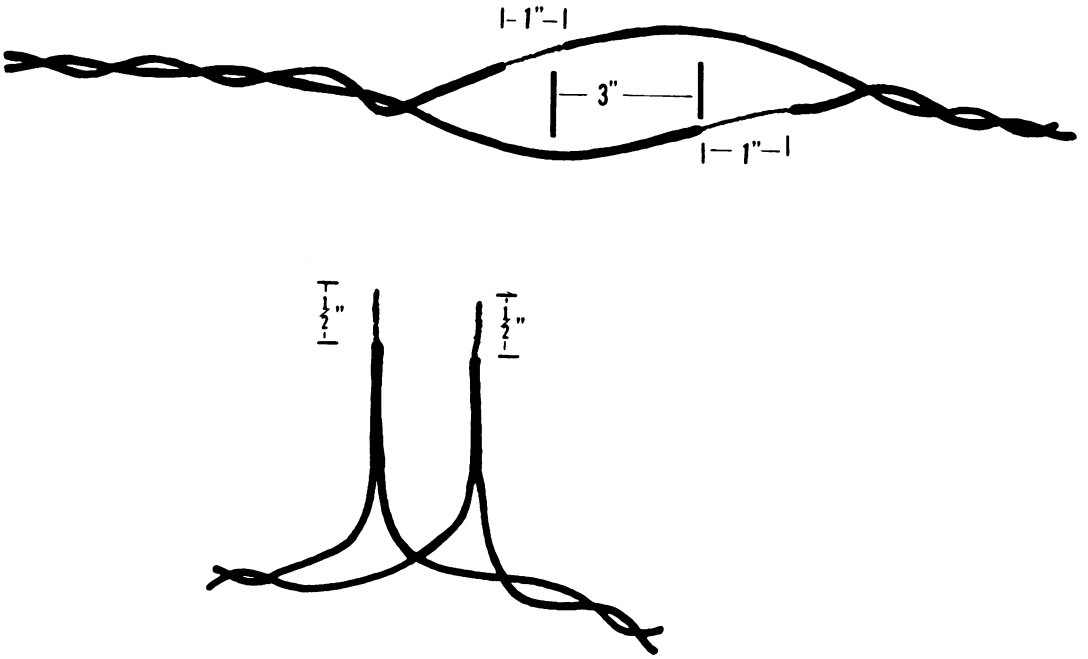

Figure 1.

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PERFORMANCE MEASURES (cont)

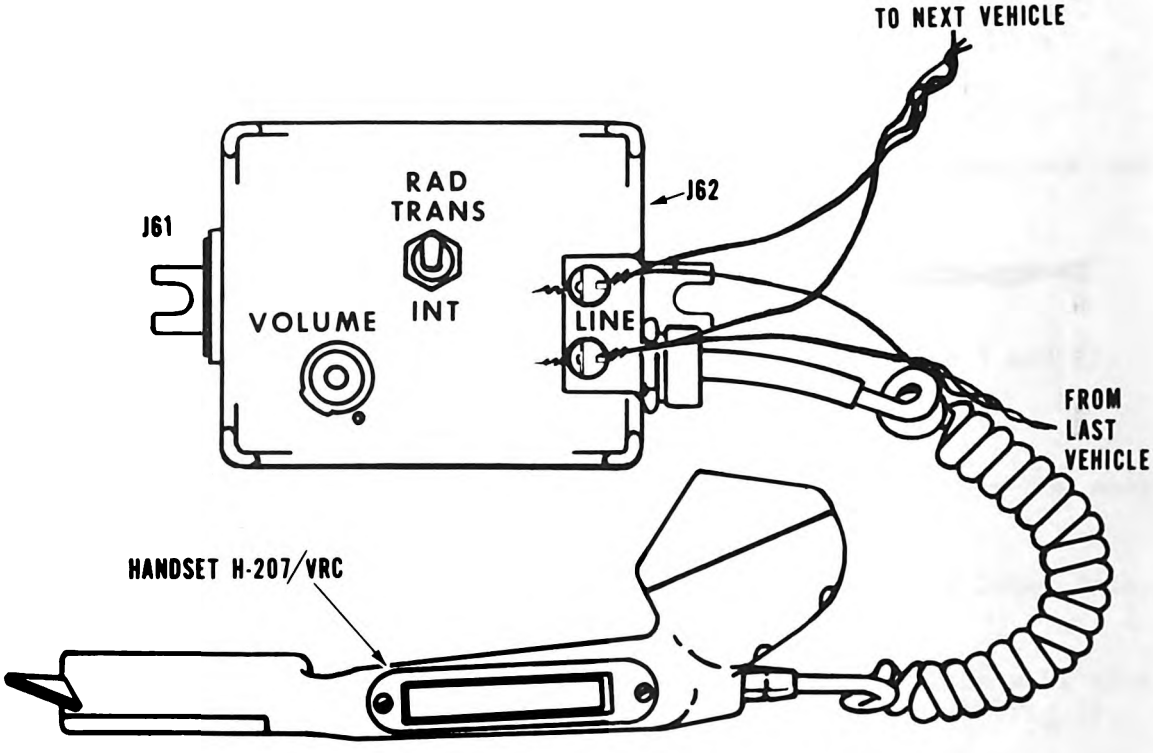

Figure 2. External Interphone Control Box C-2296/VRC.

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PERFORMANCE MEASURES (cont)

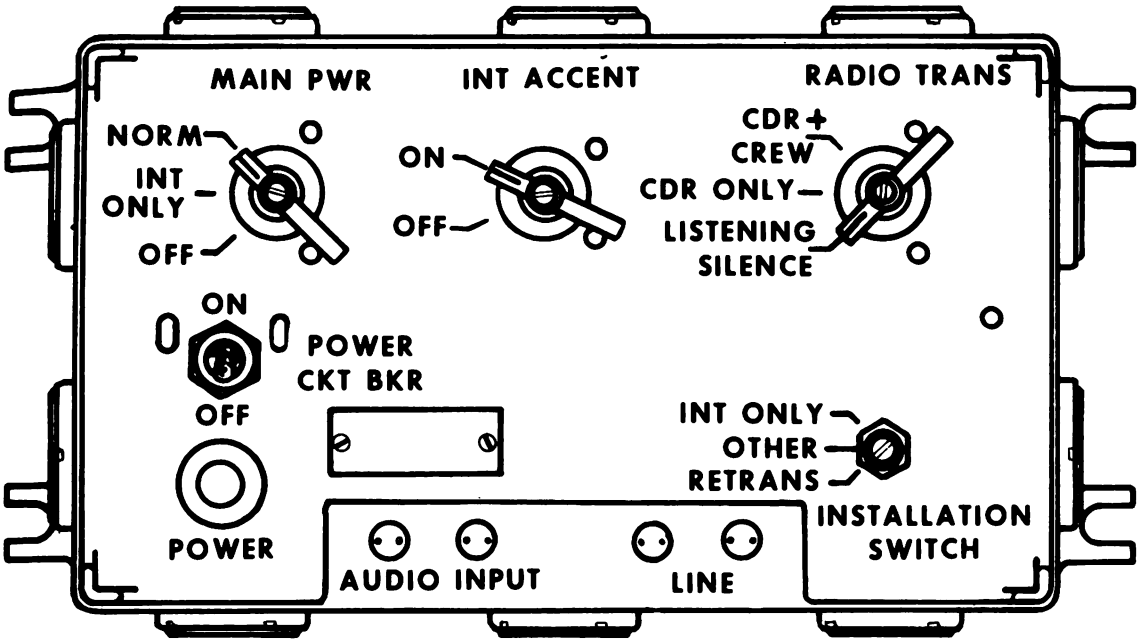

Figure 3. AM-1780/VRC.

2. Set the controls on the AM-1780/VRC (fig 3).

   a. Set the MAIN PWR switch on NORM.

   b. Set the INT ACCENT switch on ON if the tank commander wants the intercom louder than the radio.

   c. Set the RADIO TRANS switch on LISTENING SILENCE.

   d. On C-2298 and C-2297 intercom control sets, set the MONITOR switch to ALL (fig 4).

   e. On the C-2297 (driver's position), set the SIG switch to EXT (fig 4).

      Note. If the hot loop does not work, reverse the wires at the start point.

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PERFORMANCE MEASURES (cont)

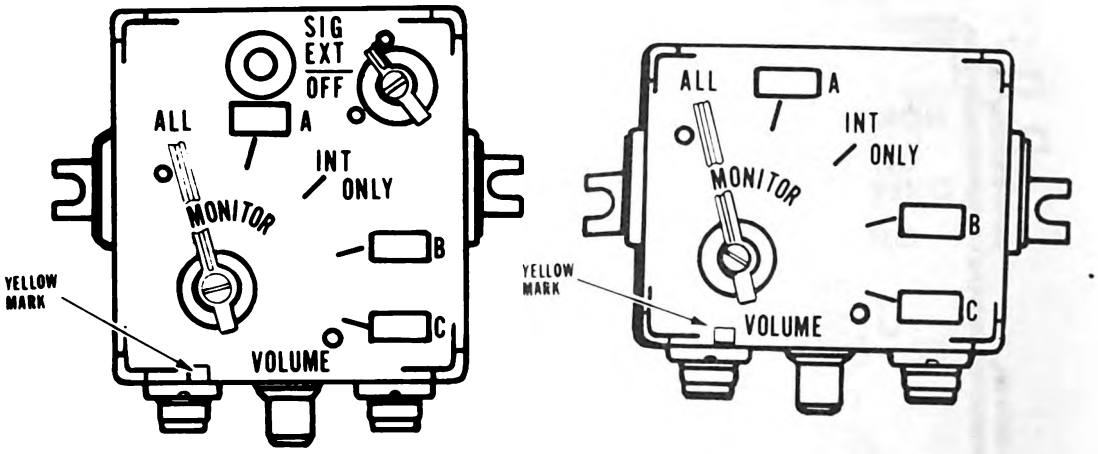

Figure 4.

3. Install the hot loop using the AM-1780/VRC audio frequency amplifier.

   a. Prepare two strands of WD-1/TT as in performance measures 1a, 1b, and 1c.

   b. Place one end of each wire into the LINE posts of the AM-1780 (fig 5).

      Note. To prevent the wire from being accidently pulled loose, anchor the wire to the turret.

   c. Tape splices as needed to prevent shorting.

   d. Set switches on the AM-1780 as shown in fig 5.

   e. Set the C-2298 and C-2297 MONITOR switch to ALL (see fig 4).

   f. Set the SIG switch on the C-2297 to EXT (fig 4).

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PERFORMANCE MEASURES (cont)

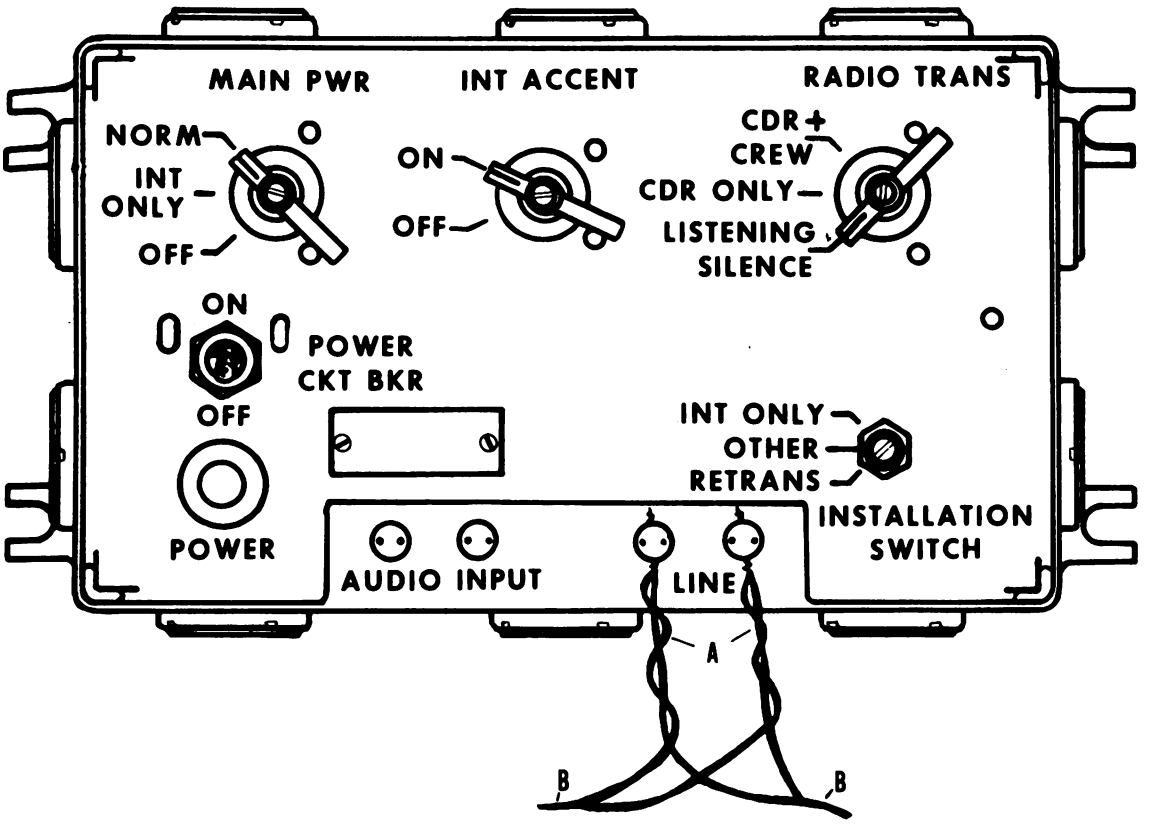

Figure 5.

REFERENCES

FM 71-1, Tank and Mechanized Infantry Company Team, app E, p E-3.

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DETERMINE PERCENT OF SLOPE OF TERRAIN USING A MAP

CONDITIONS

In a field environment, given a map, pencil, paper, and designated route.

STANDARDS

Within 4 minutes, determine within ± 5 percent the greatest percent of slope on the designated route.

PERFORMANCE MEASURES

1. Locate the steepest slope on the route.
2. Determine vertical distance for that slope by reading the contour lines.
3. Measure horizontal distance on the map for the steepest slope only.
4. Determine the percent of slope (fig 1) by using this formula:

$$\frac{\text{vertical distance (VD)}}{\text{horizontal distance (HD)}} \times 100 = \% \text{ of slope}$$

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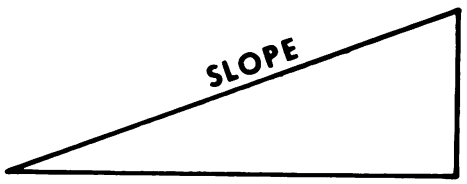
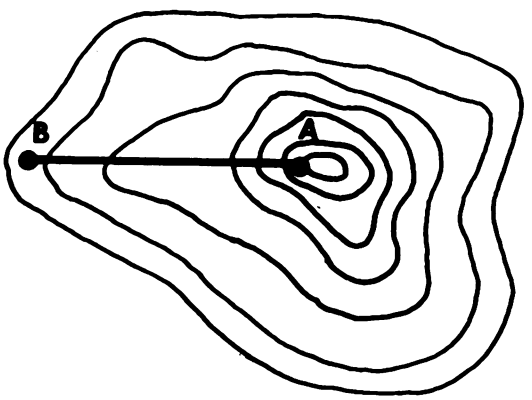
PERFORMANCE MEASURES (cont)



(Horizontal Distance)

$\frac{VD}{HD}$ x 100 = percentage of slope

EXAMPLE 1:



Distance A to B = 3,000m

Height A = 700m
B = 550m

Interval = 20m

VD = A to B = 150m

HD = 3,000m

$$\frac{150 \times 100}{3,000} = \frac{15,000}{3,000} = 5\%$$

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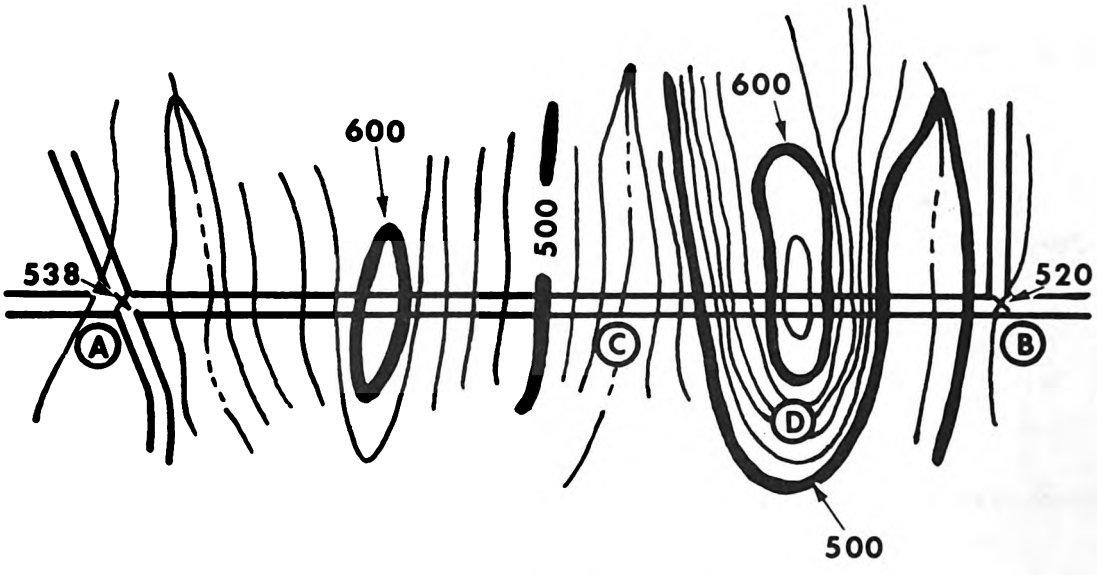
PERFORMANCE MEASURES (cont)

EXAMPLE 2:



20-meter contour interval

HD = A to B = 2,850m

HD = C to D (steepest slope) = 600m

VD Steepest Slope = 180m

$$\frac{180 \times 100}{600} = \frac{18,000}{600} = 30\%$$

Point A elevation is 538m while point B elevation is 520m. Using the total route distance of 2,850m, an erroneous slope percentage would be determined. Using A to D would also be erroneous. Always calculate using the steepest slope.

REFERENCES

FM 21-26, Map Reading, pp 6-1 thru 6-10.

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EMPLACE AND RECOVER FIELD EXPEDIENT WARNING DEVICES

CONDITIONS

In daylight, given:

1. Used C-ration cans, used ammunition boxes, or other discarded metal containers.
2. Used small arms ammunition, pebbles, or other small, hard objects.
3. A location for a defensive position.
4. Barrier wire, WD-1 communication wire, or similar wire.
5. A suspected route of enemy advance or well-defined avenue of approach.
6. Thirty minutes to complete emplacement.

STANDARDS

Within time specified, the devices must meet the following specifications:

1. Security. Devices must be securely attached to either barrier wire or WD-1 communication wire, etc., along a known or suspected route of enemy advance.
2. Concealment. Devices must not be readily observable by any enemy approaching at night.
3. Forewarning. Devices must produce sufficient noise to warn personnel in defensive position of enemy advancing toward their position.
4. Simplicity. Devices that could be used by the enemy against you must be easily removable upon leaving defensive position.

PERFORMANCE MEASURES

1. Components. Field expedient warning devices are limited only by your imagination. Four basic components are needed.

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PERFORMANCE MEASURES (cont)

a. Container (C-ration can, metal ammunition box, or any other metal container without a bright, shiny finish).

b. Noise-maker (pebbles, stones, brass ammunition casings, or any other small, hard objects which, when put in the container, will make a noise when the container is shaken.

c. Tripwire (WD-1, barrier wire, or any similar wire).

d. Attachment device (a small piece of wire, string, cloth, etc., to tie container to tripwire).

2. Construction.

a. Cut holes in the side(s) and bottom of the container (to reduce wind resistance and allow water drainage). If container has a bright, shiny finish, paint it with a subdued color (OD, brown, flat black) or cover it with mud (if only mud is available, consider using a different container).

b. Attach container to tripwire. If a wire barrier is in place, use it; if not, string tripwire across likely avenue of approach at knee level or below. Attach container at a spot where natural vegetation will conceal it from enemy detection.

c. Place noise-making objects in container.

d. Take a position at a defensive listening post and have another section/crew member brush against the wire holding the cans, to make sure you can hear the noise produced.

3. Recovery. Before leaving defensive position, recover devices that could be used by the enemy against you.

REFERENCES

TEC 952-061-0050-F, Expedient Early Warning Devices, Part 1.
TEC 952-061-0051-F, Expedient Early Warning Devices, Part 2.

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EMPLACE/RECOVER ELECTRONIC ANTI-INTRUSION DEVICES

CONDITIONS

Given a patrol seismic intrusion device (PSID) detector unit (in storage), an area for emplacement of the PSID, a detection range setting, and a PSID receiver and receiver operator in the area of emplacement.

STANDARDS

1. Within 8 minutes, emplace the PSID in accordance with the performance measures for emplacement.

2. Within 5 minutes, recover the PSID and return to storage configuration in accordance with the performance measure for recovery.

PERFORMANCE MEASURES

1. Unpacking (fig 1).

    a. Remove the detector sets and receiver sets from the carrying cases and remove the clips which are over the end of each unit. Remove the geophone from the clip on the detector, and unwrap the geophone cables. Remove the headset and headband from the carrying case. Connect the headset cable to the receiver set.

    b. Inspect each unit for damage (e.g., broken antenna, cracked case, damaged cable). If any damage exists, either repair or reject the unit.

    c. Remove the batteries from their shipping carton. Place the ON/OFF sensitivity switch on the detector sets in the OFF position, and the ON/OFF switch on the receiver set in the OFF position. Install the batteries in the detector sets and the receiver set. Place 10 spare batteries in the alarm set carrying case.

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PERFORMANCE MEASURES (cont)

d. Make sure that all detectors of the alarm set are marked with the same RF frequency as the receiver. All four pulse codes should be present. The units with the wrong frequency or pulse code will be taken from the alarm set and returned to supply.

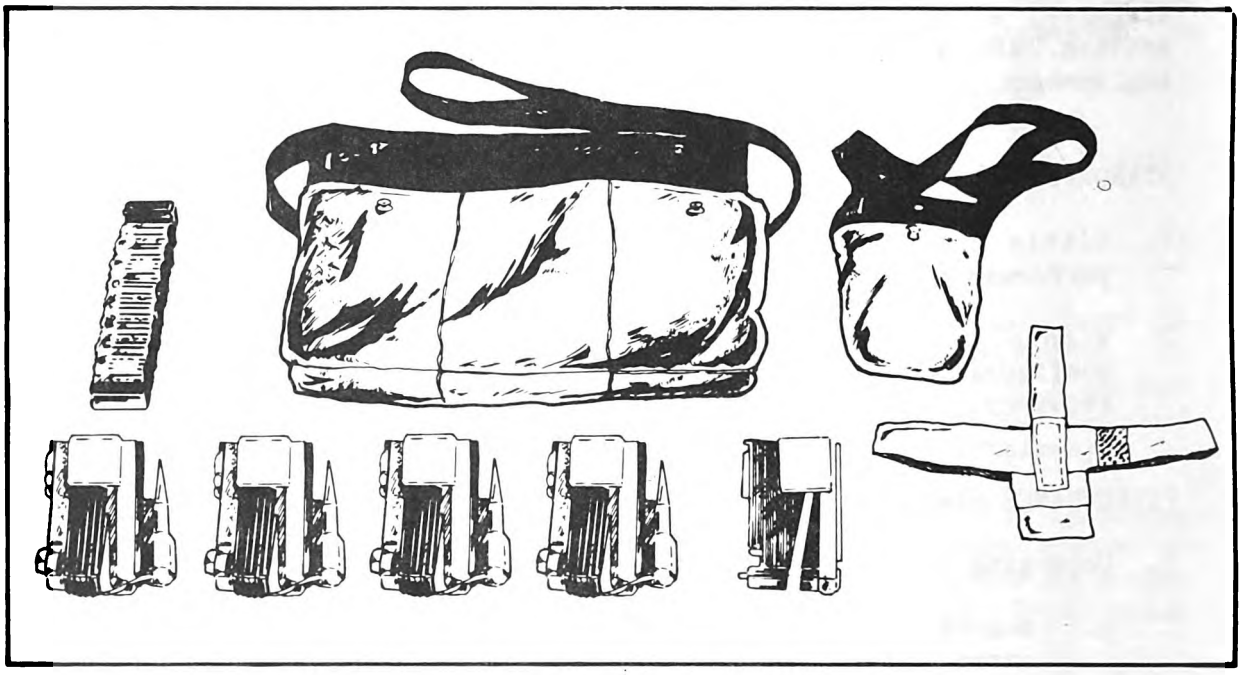

Figure 1. Alarm set, anti-intrusion (PSID).

2. Preparation and checkout.

a. Select a suitable location for the checkout area. The conditions of this area should be similar to those of the actual use area.

b. Select one of the detector sets and notice the pulse code marked on the detector case. Emplace the detector set in the checkout area as shown in figure 2. The receiver operator should be 4 to 5 meters (13 to 16 feet) from the detector set.

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PERFORMANCE MEASURES (cont)

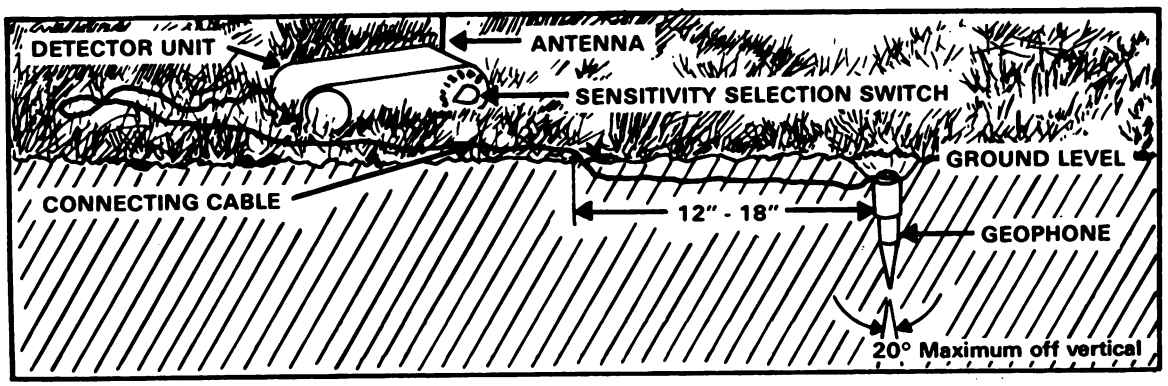

Figure 2. PSID emplacement.

c. Turn the detector ON/OFF sensitivity switch to position 1, and the receiver ON/OFF switch to the ON position. If the detector operator does not move, the receiver operator should not hear a signal. If the receiver operator does hear a signal, either there is excessive background noise in the checkout area or the detector set is defective.

d. When the detector operator moves within the radius of the detector range shown in figure 3, the receiver operator should hear a signal.

e. If the receiver operator hears a signal or signals which match the pulse code marked on the detector set, the position of the ON/OFF sensitivity switch and the distance between the detector set and receiver set should be noted for proper set-up when the detector is deployed in the use area. Return the ON/OFF sensitivity switch to the OFF position. Remove the geophone from the ground. Wipe the case and geophone clean; then return the detector set to the carrying case for move to the use area.

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PERFORMANCE MEASURES (cont)

ON/OFF SENSITIVITY SWITCH POSITIONS	PERSONNEL MOVEMENT RANGE
OFF	0 feet 0 meters
1	8 feet 2.6 meters
2	15 feet 4.9 meters
3	50 feet 16.5 meters
4	70 feet 23 meters
5	130 feet 43 meters

Figure 3. Detector sensitivity range.

f. If the receiver operator does not hear a signal, set the ON/OFF sensitivity switch to the next higher position and/or decrease the distance between the detector set and receiver set as necessary until the receiver operator hears a signal or signals matching the pulse code marked on the detector case, and repeat performance measure 2e.

g. In all cases, select the switch setting which allows no false signal when the detector operator is not moving, but which gives a signal when the detector operator moves within the detector sensitivity range. If both conditions cannot be met, select the nearest approximations or relocate the check-out area to a location with less background noise.

h. Repeat the preceding procedure for each of the detector sets.

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PERFORMANCE MEASURES (cont)

3. Emplace the detector sets.

   a. The detector sets will be emplaced as shown in figure 2. The deployment location should be one which has a low level of background noise (background noise is defined as any undesired vibration within the sensitivity range of the detector set, such as high wind, rain, low-flying aircraft, and similar sources of ground disturbances). Some areas which present high levels of background noise would be airfields, heavily traveled roadways, heavily congested areas, and roadways with heavy vehicles traveling as much as a mile from the detector set. Background noise of a sufficient level could cause the detector set to transmit meaningless signals indicating movement in an area where there is none.

   b. Remove the plastic storage clip from the PSID unit.

   c. Unclip the geophone and unwind the connecting cable and antenna. Slide the plastic clip back over one end of the detector unit so it will not be mislaid.

   d. Push the geophone straight down into the ground (no more than 20 degrees off vertical or it will not work). Do not drive the geophone into the ground by striking it with a hard object or stamping on it. Loosen the soil with an intrenching tool, stick, or other sharp object, if necessary.

   e. Bury 12 to 18 inches of the connecting cable adjacent to the geophone. This cuts down on the possibility of cable movement activating the geophone (fig 2).

   f. Position the detector unit on the ground, being sure the antenna is not in contact with any wet foliage that might ground it.

   g. Set the sensitivity selection switch for the detection range you have been given.

   h. During daylight hours, camouflage the detector unit and connecting cable with dry twigs and weeds. This is not usually necessary at night.

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PERFORMANCE MEASURES (cont)

4. Geophone. The geophone senses the movement of personnel and vehicles in the area of the detector. The detector in turn transmits a message until the movement is outside the detector's sensitivity range. If it is desirable to establish the direction of movement, the detectors can be arranged in such a manner where movement from one detector range into another detector range will indicate the direction of travel. Under ideal conditions, the transmitted signal from the detector set will be received a maximum of 1 mile (1,852 meters).

5. Receiver set.

   a. The two acceptable configurations in which the receiver set may be utilized are shown in figure 4. In configuration 4a, the receiver may be placed on a table, the ground, or held in the hand. The antenna should be free of any obstruction. In configuration 4b, the receiver may be placed in the shirt pocket.

      CAUTION: The antenna should be on the side away from the body to avoid the possibility of malfunction or poor reception due to body perspiration.

   b. When the receiver picks up the transmitted signal, it converts it to a pulsed audio tone which is heard through the headset. An experienced receiver operator will be able to determine which detector is transmitting by the tone, as well as the number of pauses. In place of the headset, a small speaker of the proper impedance may be used, or an amplifier with the proper input impedance may be used in conjunction with the receiver set.

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PERFORMANCE MEASURES (cont)

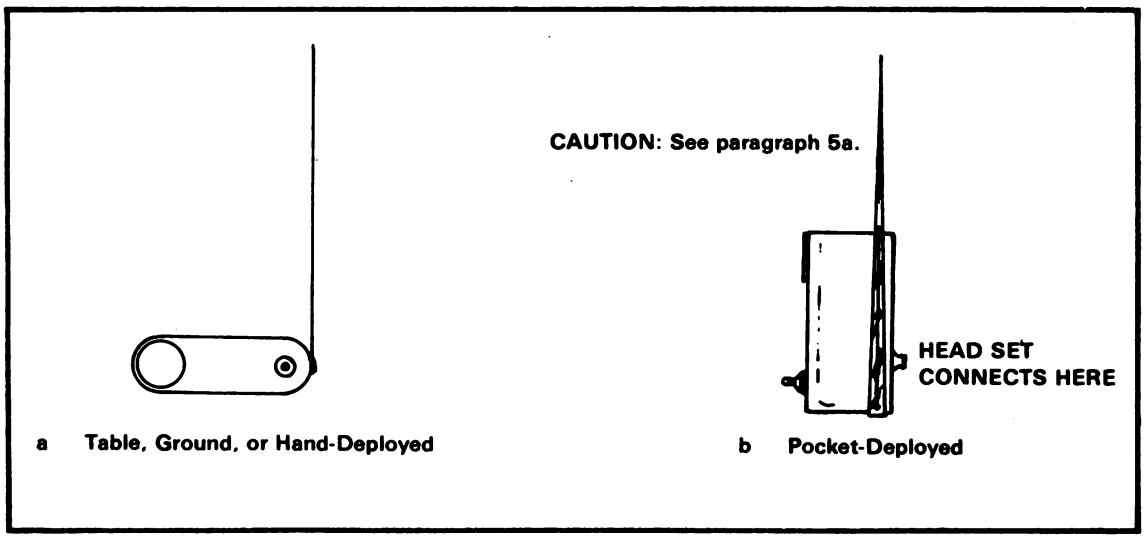

Figure 4. Receiver configuration while in use.

6. Recovering the PSID.

   a. Locate the detector unit and turn the sensitivity switch to the OFF position.

   b. Trace along the connecting cable and gently uncover the buried cable until you get to the geophone.

   c. Dislodge the geophone by grasping it, not the connecting cable, and pulling it loose.

   d. Remove the storage clip and brush all dirt and debris off the equipment.

   e. Rewind the antenna around the detector unit, wrap the cable around the unit, clip the geophone into the holder, and fasten the plastic storage slip over the wire and antenna.

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REFERENCES

TM 5-6350-249-12, AN/GSO-151, Alarm Set, Anti-Intrusion Restricted Area (PSID), C1, sec I, II, and III, pp 1-1 thru 3-3.
TEC 952-061-0054-F, Early Warning Devices: Electronic, Part 1.
TEC 952-061-0055-F, Early Warnign Devices: Electronic, Part 2.

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EMPLACE/RECOVER AN M49A1 TRIP FLARE

CONDITIONS

Given an M49A1 trip flare and a designated area for employment of an early warning device.

STANDARDS

1. The trip flare must be installed without being fired, and in such a manner that it will fire when the trip wire is moved.

2. After receiving the order to recover the trip flare, disarm and recover the trip flare without it firing.

PERFORMANCE MEASURES

1. Emplace the M49A1 trip flare.

   a. Mount the bracket by nailing, using two of the nails provided. The bracket must be as vertical as possible, 15 to 18 inches above the ground.

   b. Mount the flare, with the lever aligned with the trigger pivot.

   c. Carefully slide the flare downward into its bracket until the bottom edge of the lever is no more than 1/16 inch above--but not past--the bracket. In this position, note that the flare base is approximately 1/2 inch below the upper carriage bolt. The bottom end of the lever is approximately 3/8 inch below the bracket prongs and is centered between these prongs (fig 1).

      Note. If the flare is positioned below the slot, in the bracket, the lever will not be free to move for proper arming. If the lever is not aligned with the trigger pivot and centered between the prongs, the lever will not be free to move for proper arming.

   d. Clamp the flare in its bracket by tightening the upper wing-nut with enough force to grip the flare firmly.

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PERFORMANCE MEASURES (cont)

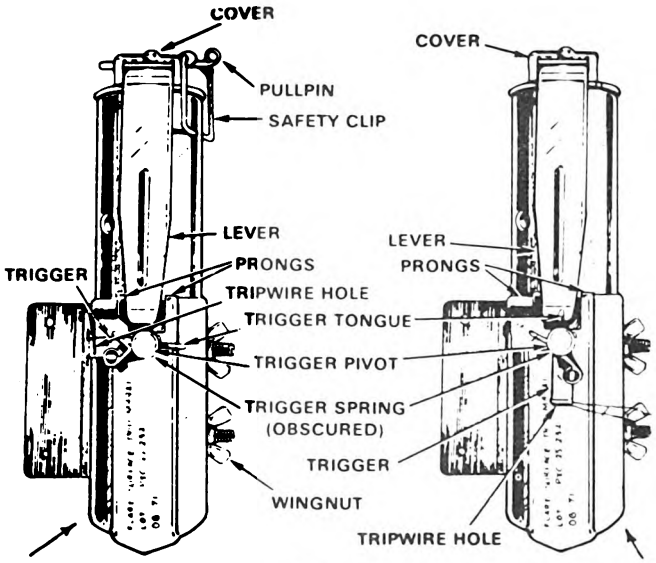

Figure 1.

2. Arm the M49A1 trip flare using the pullpin method.

   a. Fasten one end of the trip wire to a post, stake, or other rigid object, at the desired distance (usually 40 feet) from the flare and to the right or left of the flare when facing the flare trigger.

      WARNING: DO NOT RELEASE THE LEVER WHEN PRESSING IT DOWN IN PERFORMANCE MEASURE 2b, BECAUSE THAT WILL CAUSE THE FLARE TO FUNCTION.

   b. Press the lever down with one hand and remove the safety clip assembly.

   c. While still holding the lever, insert the pullpin, attached to the safety clip through the two safety clip holes of the cover loading assembly.

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PERFORMANCE MEASURES (cont)

WARNING: BEFORE RELEASING THE LEVER IN PERFORMANCE MEASURE 2d, MAKE CERTAIN THE PULLPIN WILL HOLD IN THE SAFETY CLIP HOLES.

d. Carefully release your hold on the lever. Make certain the pullpin is retained in the safety clip holes by the lever.

e. Pull the loose end of the trip wire taut and fasten it to the loop in the pullpin.

f. Check to see that the trip wire is taut and tightened at both ends.

g. The flare is now prepared for firing. Sufficient pressure applied to the trip wire will pull the safety from the flare.

Note. Misfire of the M49A1. In case of failure to fire, the flare should not be approached for 5 minutes. After the waiting period, the flare should be removed carefully and forwarded to authorized personnel for disposal.

3. Recover the M49A1 trip flare.

WARNING: ANY FLARE HAVING A LOOSE COVER LOADING ASSEMBLY WILL BE FORWARDED TO AUTHORIZED PERSONNEL FOR DISPOSAL. MAKE NO ATTEMPT TO REASSEMBLE OR TIGHTEN THE COVER LOADING ASSEMBLY.

a. Disarm the trip flare.

(1) Carefully depress the lever against the flare body.

(2) If pullpin was used as a method of arming, remove the pullpin.

WARNING: USE ONLY THE SAFETY CLIP HOLES IN THE COVER LOADING ASSEMBLY WHEN REASSEMBLING THE SAFETY CLIP. THE OTHER HOLES MUST NOT BE USED.

(3) Secure the lever by inserting one end of the safety clip through one of the safety clip holes of the cover loading assembly; snap the other end of the safety clip into the other safety clip hole.

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PERFORMANCE MEASURES (cont)

b. Recover the M49A1 trip flare.

(1) Detach the wire from the pullpin.
(2) Return the flare to its original packing.

REFERENCES

FM 5-25, Explosives and Demolitions, chap 1, sec VI, pp 1-36 thru 1-37.
FM 5-34, Engineer Field Data, chap 3, sec I, p 46b.
FM 20-32, Mine/Countermine Operations at Company Level, app D, p 153.
TM 9-1345-200, Land Mines, C1, 3, 5, 6 and 7, chap 5, p 107.

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ESTABLISH AN OBSERVATION POST (OP)

CONDITIONS

In a defensive position, given a section or platoon, all assigned TOE equipment, a TA-312/PT (or TA-1/PT) and/or a radio, and a requirement to establish an OP to observe a designated area or probable avenue of approach forward of or on the flanks of your squad or platoon.

STANDARDS

Upon moving into the assigned defensive position, you will select and emplace an OP which:

1. Is within effective small arms range of the squad/platoon.

2. Allows detection of enemy activity within the designated area or avenue of approach before it will be detectable from the defensive positions, and before the enemy can detect the defensive area.

3. Has a means of communication (wire or radio) with the platoon leader (may be through the squad leader).

PERFORMANCE MEASURES

1. General. OPs are generally established along probable avenues of approach to listen and observe and provide early warning of enemy approach.

2. Selection of an observation post (OP).

   a. The site selected for an observation post should provide:

      (1) Maximum observation of the desired area (specified by the platoon leader).

      (2) Cover and concealment for the occupants of the OP.

      (3) Concealed routes to and from the OP.

   b. Observation is the primary means of determining whether or not the above conditions exist at a site.

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PERFORMANCE MEASURES (cont)

c. Usually, the best location for an OP is on or near the military crest of a hill. Topographical crests should be avoided because of the possibility of being skylined. It may be appropriate to establish the OP well down the forward slope when observation is restricted by the terrain (fig 1).

d. Observation posts and listening posts should be within effective small arms range of unit establishing OP and supported by other supporting fires when possible.

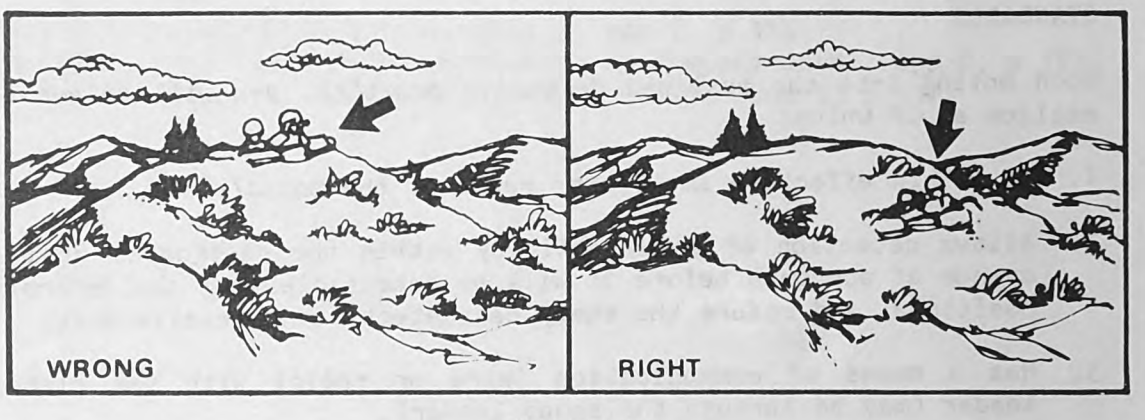

Figure 1.

3. Establish and operate an observation post.

a. Wire is the primary means of communication with an OP and is supplemented by radio. Wire and radio antennas should be carefully positioned and camouflaged to avoid detection by the enemy (fig 2).

Figure 2.

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PERFORMANCE MEASURES (cont)

b. Personnel going to and from the OP must move carefully so that movement does not reveal the location to the enemy. Separate routes to and from the OP are established. Camouflage is most important on an OP. The OP should be camouflaged even when natural concealment is adequate.

c. OPs are operated in reliefs. A minimum of two men is necessary for each relief. One observes while the other records and reports observed information. The observer and recorder should switch duties every 30 minutes, because the visual efficiency of an observer decreases rapidly after that length of time.

4. Establish and operate an observation post (OP) during limited visibility.

a. This OP is a position from which you listen and observe during periods of limited visibility (darkness, smoke, or bad weather). The enemy may use different, more open avenues of approach during limited visibility conditions; therefore, an OP may have to be moved to another position to serve as an OP at night.

b. These types of OPs are usually closer to defensive positions. You may be given a night-vision device for use on your OP. The enemy employs infiltrators against your defense at night, so a series of competent OPs is your best security. OPs backed up by alert troops equipped with night-vision devices, and by snipers, can counter this infiltration.

c. OPs are operated in reliefs except when movement to and from positions would reveal their locations or endanger the personnel.

REFERENCES

FM 21-75, Combat Skills of the Soldier (revised edition to be published).

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CLASSIFY A ROUTE AND PREPARE AN OVERLAY

CONDITIONS

In a field environment, given a vehicle with crew, an assigned route to classify, a topographic map (1:50,000), a metric measuring tape, pencil and paper, GTA 3-7-8, Armor Bridge Classification Wheel, binoculars, compass, and overlay paper.

STANDARDS

You must classify a route and prepare and submit an overlay of the route using proper military and topographic symbols.

PERFORMANCE MEASURES

1. Classify a route.

    a. Determine route width.

        (1) Using measuring tape, measure the narrowest part of the traveled surface of the route, to include all bridges, tunnels, roads, and obstacles.

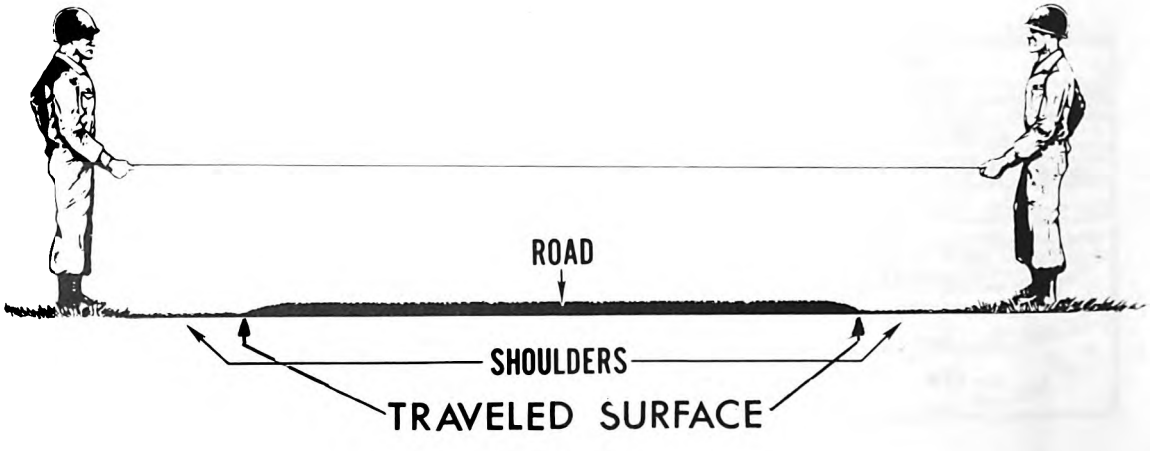

Figure 1.

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PERFORMANCE MEASURES (cont)

b. Determine the number of lanes (see example).

(1) Divide the width of the route by 3.5 to determine the number of lanes for wheel vehicles.
(2) Divide the width of the route by 4.0 to determine the number of lanes for track vehicles.
(3) Round all fractions down to the nearest whole number.

EXAMPLE 1: Route Width 16.8m

Wheel vehicles

16.8 ÷ 3.5 = 4.8 rounded down to 4 lanes

Track vehicles

16.8 ÷ 4.0 = 4.2 rounded down to 4 lanes

c. Estimate the type of route you are classifying (see table 1).

X: An all-weather route that can bear near maximum traffic year-round with only normal maintenance. An interstate highway is an example of an X-type route.

Y: A route that can bear varying amounts of traffic according to weather conditions, but still can be classified as an all-weather route with reasonable maintenance. Concrete or blacktop roads are examples of Y-type routes.

Z: A fair-weather route that deteriorates and becomes impassable in adverse weather, and can not be maintained short of major construction. Dirt and gravel roads are examples of z-type routes.

Table 1.

d. Determine the classification of each bridge along the route using the Armor Bridge Classification Wheel (GTA 5-7-8).

e. Determine if obstacles restrict the type of vehicles or the amount and flow of traffic along the route.

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PERFORMANCE MEASURES (cont)

(1) With the measuring tape, measure the height above the route of any obstacle that crosses the route.
(2) Note any appropriate detours for nonnegotiable obstacles.

2. Prepare a route reconnaissance overlay of the route (fig 2).

a. Orient the overlay paper over the map area to be reconnoitered.

b. Trace the grid intersections nearest the two opposite corners of the overlay paper and label each with the proper grid coordinates.

c. Draw the overlay with a pen or pencil that will make a lasting mark without cutting the paper.

d. Draw all reconnaissance information on the overlay using standard topographic or military symbols (fig 3). Those symbols you invent must be identified in the legend of the overlay.

e. Print the marginal information in the lower right corner of the overlay (fig 2).

(1) Title and objective tells the reason the overlay was made and also gives actual locations.

(2) Time and date describes the exact time the information was obtained.

(3) Map reference gives sheet name, sheet number, map series number, and the scale of the map.

(4) Author -- name, rank, and organization of the author with date and time the overlay was prepared.

(5) Legend -- only necessary when nonstandard symbols are used.

(6) Security classification -- must correspond to the highest classification of the map or information placed on the overlay. If both are unclassified then it should be so stated at the top and bottom of the overlay (fig 2).

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PERFORMANCE MEASURES (cont)

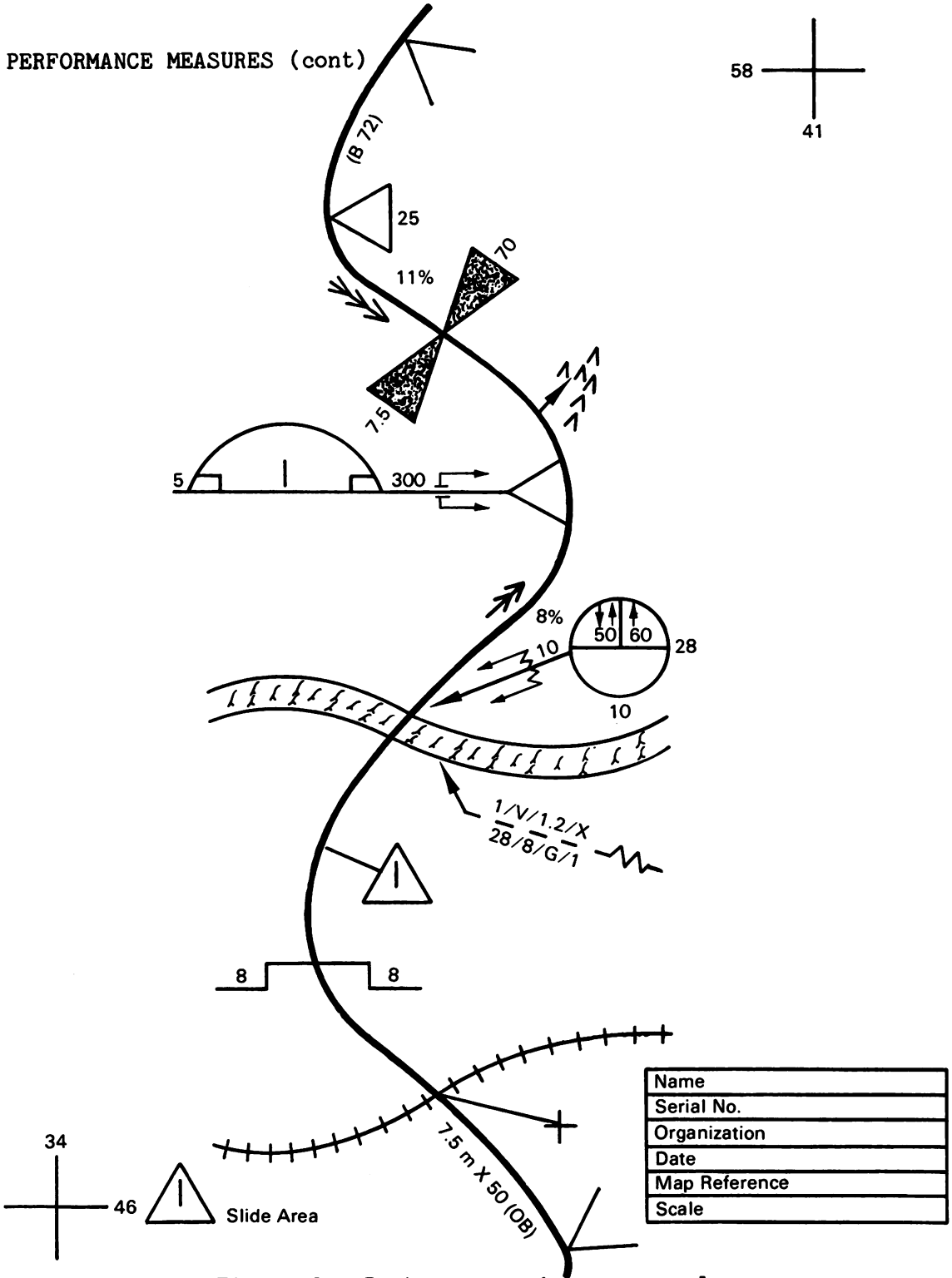

Figure 2. Route reconnaissance overlay.

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PERFORMANCE MEASURES (cont)

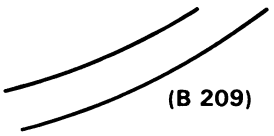
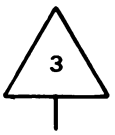
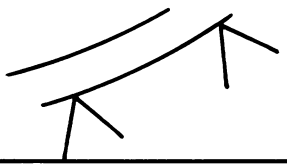
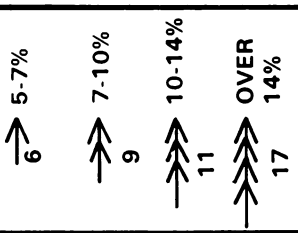
Serial No.	Explanation	Symbol	Remarks
1.	Civil or military route designation.		Designation written in parentheses along route.
2.	Critical point.		To be numbered and described in legend. Critical points may be used to point out features not adequately covered in other reconnaissance symbols.
3.	Limits of sector.		Limits of reconnoitered sector of route.
4.	Route classification formula.	a. 10.5m x 120 b. 6mZ 8 (OB) c. 9mY 20 (OB)(W)	Expressed in order of width, type, military load classification, obstructions, if present, and regular flooding or snow blockage: X - all weather route Y - all weather route (limited traffic) Z - fair weather route (T) - regular snow blockage (W) - regular flooding (OB) - obstructions
5.	Grades		Arrows point in uphill direction; to the right of symbol is shown the actual percent of slope; length of arrow represents length of grade if map scale permits.

Figure 3. Standard route reconnaissance symbols

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PERFORMANCE MEASURES (cont)

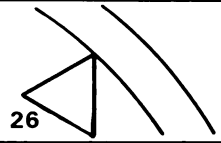
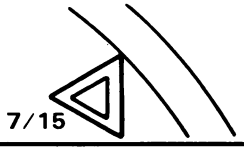
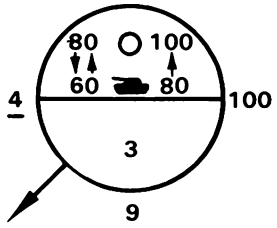
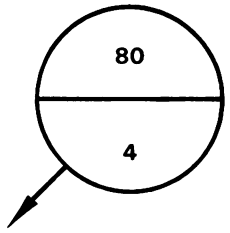
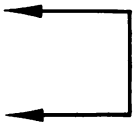
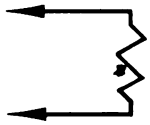
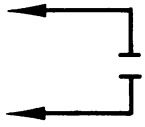
6.	Sharp curve.		Vertex of triangle points to map location of curve. Figure indicates radius in meters.
7.	Series of sharp curves.		Left figure indicates number of curves; right figure, the radius in meters of the sharpest curve.
8.	Full bridge symbol.		Arrow extends to map location of bridge; minimum width is placed below, overhead clearance to the left, and overall length to the right of basic symbol. Lower portion of symbol indicates bridge serial number; upper portion, military load classification data. Underlined values are those below minimum standard. All linear distances are in meters.
9.	Abbreviated bridge symbol.		Arrow extends to map location of bridge. Lower portion of smybol indicates bridge serial number; upper portion, military load classification. Class number must be underlined if width or overhead clearance is below minimum standard.
10.	Bypass easy.		Used in conjunction with bridge and tunnel reconnaissance symbols.
11.	Bypass difficult.		Used in conjunction with bridge and tunnel reconnaissance symbols.
12.	Bypass impossible.		Used in conjunction with bridge and tunnel reconnaissance symbols.

Figure 3. Standard route reconnaissance symbols.(cont).

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PERFORMANCE MEASURES (cont)

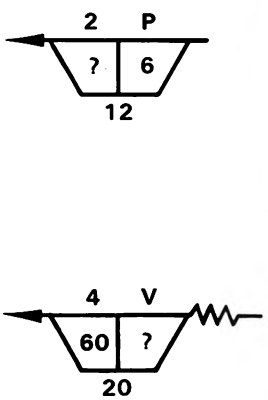
13.	Ford		Arrow extends to ford location. Data above the line expressed in order of serial number, ford type, stream velocity, in meters per second, and seasonal limitations. Data below the line expressed in order of length (meters), width (meters), bottom type, and depth (meters). Question marks indicate unknown information. Difficult approaches are represented by zigzag lines corresponding in position to shore where approach is located. **Ford Type** V - vehicular P - pedestrian **Seasonal Limiting Factors** X - none Y - significant **Bottom Type** M - mud C - clay S - sand G - gravel R - rock P - artificial paving
14.	Ferry		Arrow extends to map location. Data above symbol is expressed in order of ferry serial number and ferry type. Data inside symbol is expressed in order of military load class of deck and dead weight capacity in tons; data below symbol is turn around time in minutes. Question mark indicates unknown information. Difficult approaches are represented by zigzag lines corresponding in position to shore where approach is located. **Ferry Type** V - vehicular P - pedestrian

Figure 3. Standard route reconnaissance symbols (cont).

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PERFORMANCE MEASURES (cont)

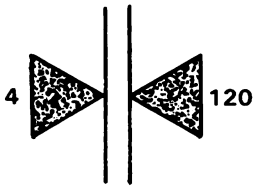
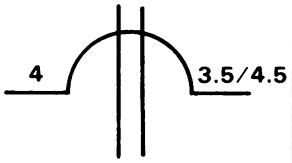
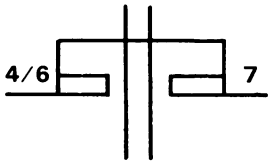
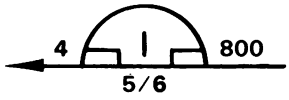
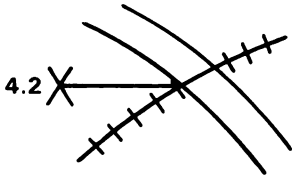
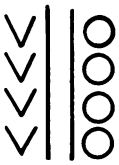
15.	Width constriction.		Route constriction. The figure to the left indicates the width of the constriction; that to the right the total constricted length; both dimensions are in meters.
16.	Arch underpass constriction.		Width to left of symbol, overhead clearance to the right, both in meters. Both minimum and maximum overhead clearances, if different, will be given.
17	Rectangular underpass constriction with sidewalks.		Width of traveled way followed by total width including sidewalk to left of symbol, overhead clearance to right, dimensions in meters.
18.	Tunnel with sidewalks.		Arrow extends to map location. Serial number is placed inside the symbol. The width of the traveled way followed by total width including sidewalks (in meters) is placed below the symbol. Overhead clearance is placed to the left of the symbol and total tunnel length to the right, both in meters. A question mark represents unknown information. Bypasses are shown by standard symbol notations.
19.	Railroad grade crossing.		Level crossing; passing trains will interrupt traffic flow. The figure indicates height, in meters of power line (if any) above the ground.
20.	Concealment.		Road lined with trees; deciduous trees (left) and evergreen (right).

Figure 3. Standard route reconnaissance symbols (cont).

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PERFORMANCE MEASURES (cont)

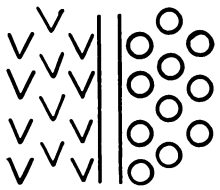
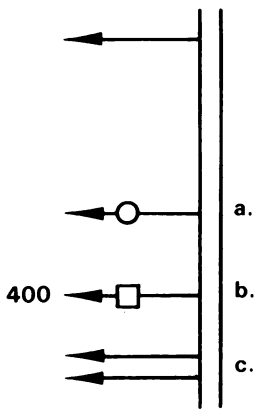
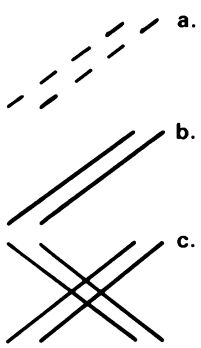
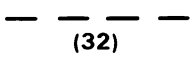
21.	Concealment.		Woods bordering road; deciduous trees (left), evergreen trees (right).
22.	Possibility of driving off road. The symbol may be amplified as follows: a. Wheeled vehicle b. Tracked vehicle c. A length of road exceeding 1 km where driving off is possible.		Arrow indicates direction of turnoff. The figure indicates the length in meters of the turnoff.
23.	Roadblock, craters, and blown bridges. a. Proposed b. Prepared but possible. c. Completed.		Center of the symbol indicates position of block.
24.	Lateral route.		Part of a military road maneuver network which runs generally parallel to the FEBA and leads into or across axial routes. It is identified by an even number and is depicted by a broken line.

Figure 3. Standard route reconnaissance symbols (cont).

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PERFORMANCE MEASURES (cont)

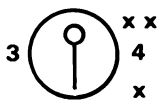
25.	Axial route.	(57)	Part of a military road maneuver network which leads to and runs generally perpendicular to the FEBA. It is identified by an odd number and is depicted by a solid line.
26.	Unknown or doubtful information.	?	
27.	Parking area.		
28.	Traffic control post.		Traffic control post no. 3 traffic control post, 4th Infantry Division.

Figure 3. Standard route reconnaissance symbols (cont).

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PERFORMANCE MEASURES (cont)

3. Submit the overlay of the route to your platoon leader.

REFERENCES

FM 21-26, Map Reading.
FM 17-95, Cavalry.
FM 5-36, Route Reconnaissance and Classification.
TM 5-700, Field Water Supply.
GTA 3-7-8, Armor Bridge Classification Wheel.

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REACT TO DIRECT/INDIRECT FIRE AS A VEHICLE COMMANDER

CONDITIONS

Given a combat vehicle with crew, equipment, and various types of enemy fire.

STANDARDS

Within 3 seconds after receiving direct, indirect, or aircraft fire, take immediate action.

PERFORMANCE MEASURES

1. React to direct enemy fire (fig 1).

    a. Return fire immediately.

        (1) Fire directly at the enemy.

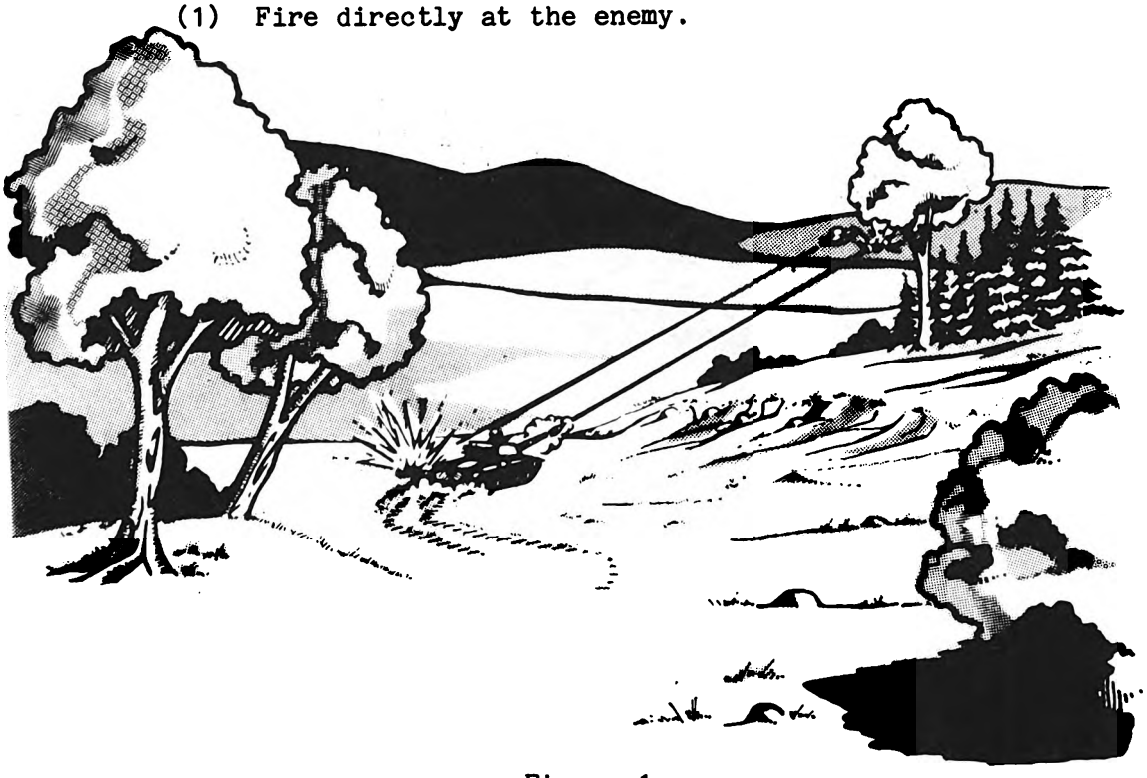

Figure 1.

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PERFORMANCE MEASURES (cont)

(2) Fire suppressive fire in the vicinity of the origin of an antitank guided missile's (ATGM) smoke trail (fig 2).

Note. Suppressive fire will cause the gunner to lose control of the missile and your vehicle's movement will force him to miss his target.

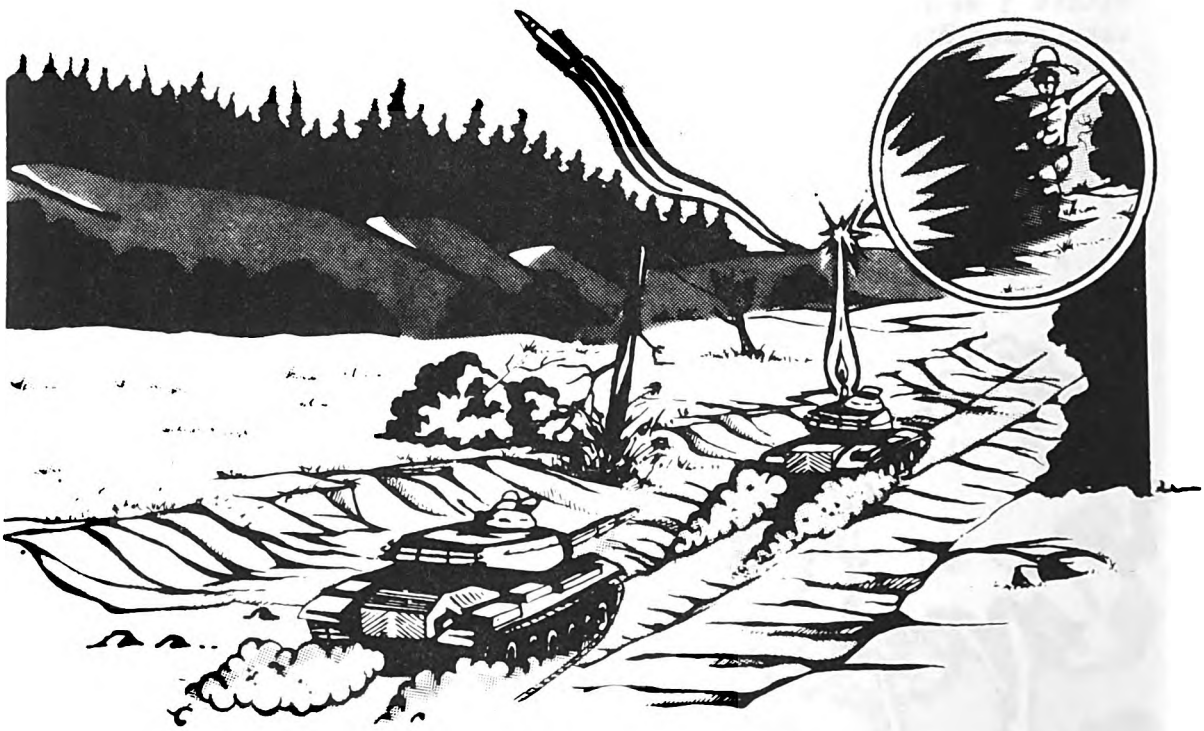

Figure 2.

b. Move to a covered and concealed position and continue to fire until the target is eliminated.

c. When you are in a defensive position, move to a predesignated alternate firing position when ordered to do so by the platoon leader.

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PERFORMANCE MEASURES (cont)

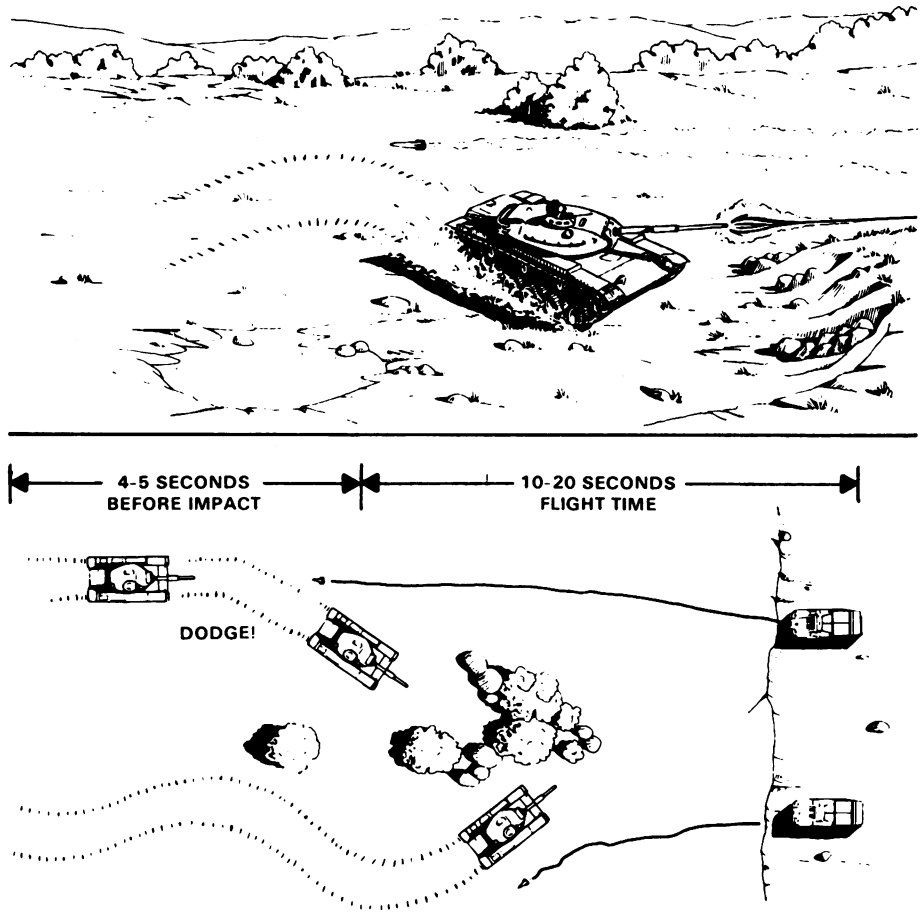

Figure 3. ATGM counteraction drill.

2. React to indirect fire.

   a. Button up.
   b. Continue towards the objective.
   c. When you are in a defensive position, move to a predesignated alternate position when ordered to do so by the platoon leader.

   Note. Put on a protective mask if an NBC attack is suspected (see Task Summary 031-503-1012 or 031-503-1902).

3. React to aircraft fire (fig 4).

   a. Engage attacking aircraft immediately with automatic weapons.

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PERFORMANCE MEASURES (cont)

b. Turn away from the axis of the attack.
c. Seek cover and concealment.

Figure 4.

Note. Vehicles concentrated at assembly areas and in column formation are highly susceptible to aircraft attack.

REFERENCES

FM 71-1, Tank and Mechanized Infantry Company Team, pp 1-9, 2-14, and 2-15, and app I.
FM 17-12, Tank Gunnery, pp 8-9, 9-10, 16-1 thru 16-11.

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PLACE THE AUTOMATIC CHEMICAL AGENT ALARM SYSTEM INTO OPERATION

CONDITIONS

Given an automatic chemical agent alarm and directed to place it into operation, one reel of telephone cable (WD-1), and TM 3-6665-225-12.

STANDARDS

1. All components are present.
2. All components are visibly free from defect; those that are not are reported to the supervisor.
3. The alarm is in operation (detects the presence of an agent and alerts).

PERFORMANCE MEASURES

1. Make sure the basic components are present.
   a. One M43 detector unit (fig 1).

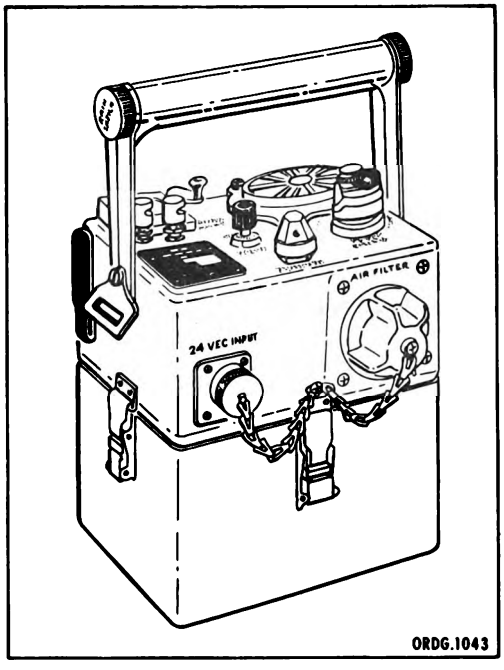

Figure 1.

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PERFORMANCE MEASURES (cont)

d. One EA3517/U battery (fig 4).

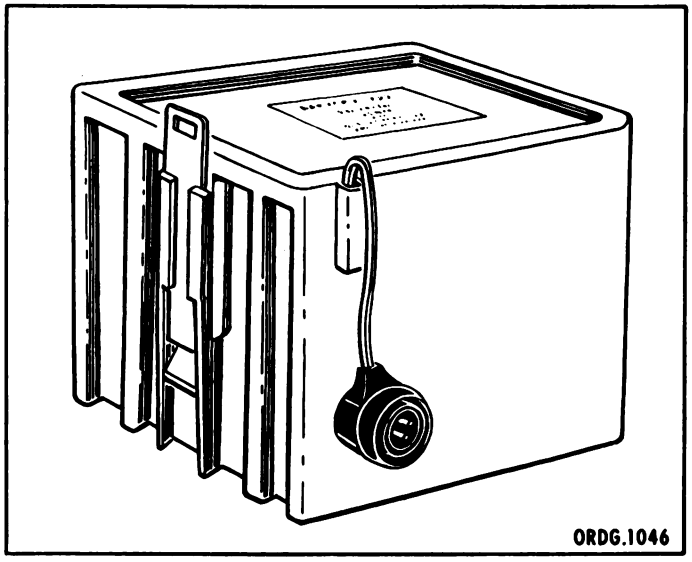

Figure 4.

e. Four BA3030 batteries (fig 5).

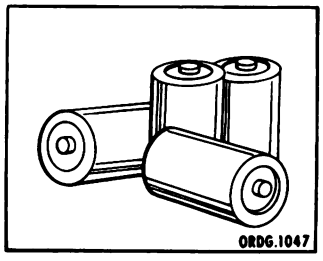

Figure 5.

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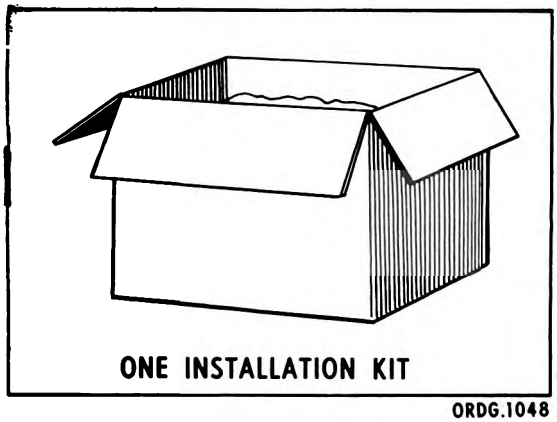
PERFORMANCE MEASURES (cont)

f. If you have a mobile or mobile/fixed model, you will also have an installation kit and a mounting kit (fig 6).



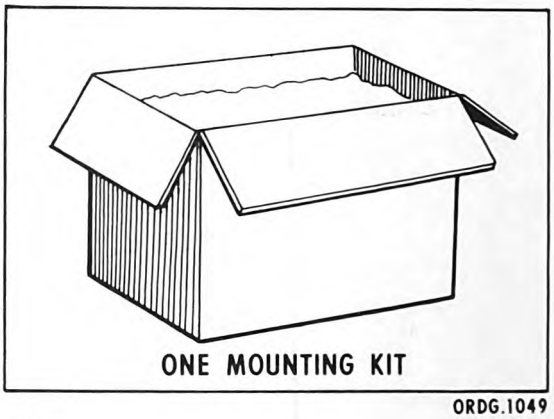


Figure 6.

g. The fixed and mobile/fixed models are issued with an additional item, an M10 power supply (fig 7).

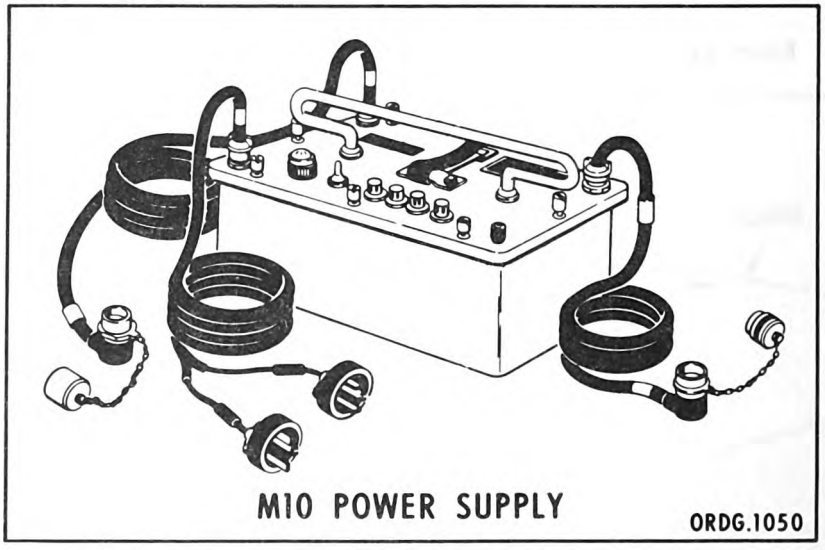


Figure 7.

2. Perform preoperational procedures as described in TM 3-6665-225-12, chap 2, para 2-6; or TC 3-3, pp 22 thru 28.

3. Perform prestartup procedures as described in TM 3-6665-225-12, chap 2, para 2-7; or TC 3-3, pp 29 and 30.

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PERFORMANCE MEASURES (cont)

4. Install the equipment as a system as described in TM 3-6665-225-12, chap 3, para 3-1 thru 3-4; or TC 3-3, p 31.

5. Start up and operate the alarm system as described in TM 3-6665-225-12, chap 2, para 2-9; or TC 3-3, pp 33 thru 36.

REFERENCES

TM 3-6665-225-12, Alarm, Chemical Agent, Automatic: Portable, chap 2, para 2-6, 2-7, 2-9; chap 3, para 3-1 thru 3-4.
TC 3-3, How to Use the Automatic Chemical Agent Alarm, pp 22 thru 36.

SQT ADMINISTRATIVE INSTRUCTIONS

Operability of the chemical agent alarm system can be checked by igniting a smoke grenade beside the detector unit.

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SERVICE THE AUTOMATIC CHEMICAL AGENT ALARM SYSTEM

CONDITIONS

Given an automatic chemical agent alarm which has been in continuous operation for 12 hours, or has signaled the presence of chemical agents, and command guidance to continue using the alarm.

STANDARDS

The alarm is serviced so that, when placed back in operation, it detects the presence of chemical agents and alerts.

PERFORMANCE MEASURES

1. Twelve-hour servicing procedure: Check and service the alarm after 12 hours of continuous operation as described in TM 3-6665-225-12, chap 2, para 2-10; or TC 3-3, p 37.

2. After-alert servicing:

   a. Shut down the alarm after an operational alert as described in TM 3-6665-225-12, chap 2, para 2-11; or TC 3-3, p 38.

   b. Reactivate the alarm after an operational alert as described in TM 3-6665-225-12, chap 2, para 2-12; or TC 3-3, p 39.

REFERENCES

TM 3-6665-225-12, Alarm, Chemical Agent, Automatic: Portable, chap 2, para 2-10, 2-11, and 2-12.
TC 3-3, How to Use the Automatic Chemical Agent Alarm, pp 37 thru 39.

SQT ADMINISTRATIVE INSTRUCTIONS

Operability of the chemical agent alarm system can be checked by igniting a smoke grenade near the detector unit.

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PERFORM LESS-THAN-72-HOUR CHEMICAL AGENT ALARM SHUTDOWN OPERATIONS

CONDITIONS

In the field, chemical threat is such that the automatic alarms are ordered shut down, but are to be ready in case the situation changes. Given an automatic chemical agent alarm and TM 3-6665-225-12.

STANDARDS

The alarm is shut down without damage.

PERFORMANCE MEASURES

1. Set M10 power supply switch to OFF (fig 1).

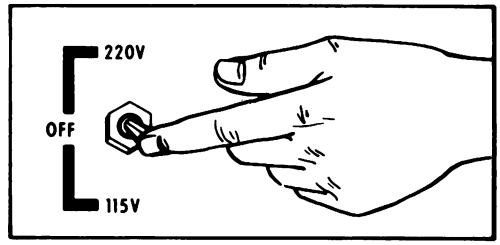

Figure 1.

2. Set M42 alarm unit switch to HORN OFF (fig 2).

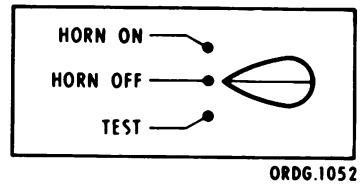

Figure 2.

3. Press horn VOL battery test knob on M43 detector unit to check battery. If meter reads less than 24, discard BA3517/U battery and obtain a new battery or turn in a BB501/U battery for recharging.

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PERFORMANCE MEASURES (cont)

4. Disconnect power source from 24 VDC connector. Install the cover.

5. Disconnect the wires from the binding posts.

6. Release the four catches and lift the detector unit assembly from the bottom case assembly.

7. Unscrew the solution reservoir and discard the solution according to SOP. Screw the empty reservoir assembly back in place.

8. Set the detector unit assembly in the bottom case assembly. Latch the four catches.

9. Make sure that the rain shield and adapter are in the handle, that the air inlet is in the closed position, and that the plug is screwed in securely.

10. Snap the cap over the air outlet.

11. Pull the handcrank up to its storage position.

REFERENCES

TC 3-3, How to Use the Automatic Chemical Agent Alarm, p 40.
TM 3-6665-225-12, Alarm, Chemical Agent, Automatic: Portable, chap 2, para 2-13.

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PERFORM MORE-THAN-72-HOUR CHEMICAL AGENT ALARM SHUTDOWN OPERATIONS

CONDITIONS

In the field, the chemical threat is such that the use of chemical agents is not anticipated for more than 72 hours. Given an automatic chemical agent alarm and directed to shut it down for more than 72 hours. TM 3-6665-225-12 is available.

STANDARDS

Without damage to the equipment, the M10 power supply (if used) is disconnected, the M42 alarm unit is inactivated, and the M43 detector unit is shut down.

PERFORMANCE MEASURES

1. Remove alarm from vehicle when mounted.
2. Disconnect the M10 power supply (if used).
   a. Set the switch to OFF (fig 1).

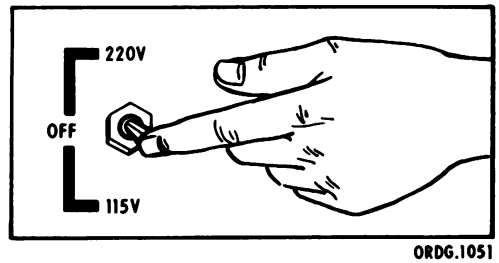

Figure 1.

   b. Disconnect the detector power cable from the M43 detector unit.
   c. Disconnect the standby battery cable from the BA3517/U battery.
   d. Disconnect the 115V/220V cable from the power source.

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PERFORMANCE MEASURES (cont)

e. Secure the cables to the handle with the strap.

3. Inactivate the M42 alarm unit.

a. Set the switch to HORN OFF (fig 2).

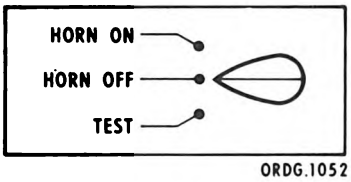

Figure 2.

b. Disconnect the wires from the binding posts.

c. Loosen the four knurled screws on the cover and separate the front panel from the case.

d. Flip the front panel over and take out the old BA3030 batteries by pulling back the spring catch and lifting the cover.

e. Close the battery cover, making sure the spring is fully engaged.

f. Reassemble the front panel to the case, making sure the four knurled screws are screwed down tight.

4. Shut down the M43 detector unit.

a. Disconnect the power source from the 24V DC input connector.

b. Release four catches and lift the detector unit assembly from the bottom case assembly by the handle.

c. Unscrew the reservoir assembly.

d. Discard the solution according to SOP.

e. Rinse the reservoir assembly with distilled water. Fill it approximately two-thirds full with distilled water.

f. Install the reservoir, turning the reservoir assembly D-ring clockwise to make sure it is tight.

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PERFORMANCE MEASURES (cont)

g. Set the detector unit assembly in the bottom case assembly. Latch the four catches.

h. Make sure that the air outlet is open and the air inlet is closed.

i. Connect cable from a BA3517/U battery to the 24 VDC input connector. If the horn sounds, press the zero adjust knob and turn it fully counterclockwise.

j. Press the handcrank in, rotate it 50 times, and release it.

CAUTION: Do not pull it out, just release it!

k. After the M43 detector unit runs for 4 minutes, disconnect the battery.

l. Release the four catches and separate the unit.

m. Unscrew the reservoir assembly, discard the liquid, and reinstall the empty reservoir assembly.

n. Secure the detector unit assembly to the case bottom assembly with the four catches.

o. Button up the unit for storage.

(1) Snap on the air outlet cap.

(2) Set the air inlet to CLOSED.

(3) Install the cover to protect the 24V DC input connector.

(4) Pull the handcrank up to its storage position.

REFERENCES

TM 3-6665-225-12, Alarm, Chemical Agent, Automatic: Portable, chap 2, para 2-13; chap 5, para 5-1 and 5-2.
TC 3-3, How to Use the Automatic Chemical Agent Alarm, pp 41 thru 43.

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TEST FOR CHEMICAL AGENTS USING A CHEMICAL AGENT DETECTOR KIT

CONDITIONS

In the field, wearing mask and gloves, entering an area suspected of being contaminated with a chemical agent, given a chemical agent detector kit.

STANDARDS

1. After testing with either the M15A2A or M256 detector kit, the presence or absence of a chemical agent is determined correctly.

2. If present, the physiological classification of the agent; e.g., nerve, blood, or blister, is reported to your supervisor.

PERFORMANCE MEASURES

1. Operate the M256 chemical agent detector kit.

   a. Remove sampler/detector from its foil envelope and check each ampoule to make sure it contains liquid.

   b. Discard tab marked 1, exposing tablet.

   c. Rub top half of white paper tab 2 on tablet.

   d. Holding protective strip up, crush all ampoules in the three center pockets (3).

   e. Rotate sampler until the protective strip is down. Using the right hand, squeeze each ampoule, forcing the liquid to each spot. The left hand is on the protective strip directly over the nerve spot.

   f. While holding it horizontally, with thumb over center spot, crush first (green) ampoule (4) in heater and swing it over spot. Leave in place 2 minutes.

   g. Swing heater and protective strip away from spots.

   h. Expose spots to air (shield from direct sun) for 10 minutes.

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PERFORMANCE MEASURES (cont)

i. While holding protective strip, crush second (green) ampoule (4), swing heater over spot. Leave in place 1 minute.

j. Swing heater away from spot.

k. Holding spots down, crush remaining two outside ampoules (5).

l. Re-rub bottom half of white paper (tab) (2) next to first mark, immediately observe for color change.

m. Turn sampler over to determine safe/danger observation and type of agent, if present.

n. Report results to supervisor.

2. Operate the M15A2A chemical agent detector kit.

a. Tear detector ticket from belt carefully. Pierce backing by pressing against the square (+) corner. Remove ticket completely and re-insert square end into package.

b. Place round end of ticket into a clean plastic pocket.

c. Add two drops of solution from white-marked bottle to pocket containing round end of ticket.

d. Squeeze ticket in pocket until paper is uniformly wet.

e. Remove clear, plastic guard from red-marked bottle.

f. Place nozzle of red-marked bottle into pocket.

g. Carefully press top to add two drops into pocket. Massage.

h. The round end should turn blue. If not, discard and repeat with a new ticket.

i. Add two drops of solution from white-marked bottle into packet containing square end.

j. Squeeze ticket in package until paper is uniformly wet.

k. Remove square end of ticket from package. Save package.

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PERFORMANCE MEASURES (cont)

l. Place square end of ticket in sampling adapter of rubber bulb with the cross toward bulb.

m. Direct ticket toward ground and slowly compress bulb 60 times.

n. Replace square end of ticket in original package.

o. Place nozzle of red-marked bottle into package.

p. Carefully press top to add two drops into package. Massage.

q. After 3 minutes, compare both ends of the ticket. The round end should be blue if the square end is blue; there is no nerve agent present. If colorless to orange, a nerve agent is present.

r. Remove blue-band tube from dispenser and snap off both ends at scored marks.

s. Insert unmarked end of tube in adapter and take 60 bulb compressions.

t. Observe for yellow-orange color which indicates presence of blood agent (CK).

u. If no reaction, add 1 drop from green bottle. Wait 1 minute, yellow-orange color indicates nerve agent (G).

v. Remove blue-band tube from dispenser and snap off both ends at scored marks.

w. Insert unmarked end of tube in adapter and take 60 bulb compressions.

x. Wait 2 minutes and add one drop from blue-marked bottle. Purple-blue or red-brown color indicates presence of a blister agent.

y. Report results to supervisor.

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REFERENCES

TM 3-6665-253-12, Operator and Organizational Maintenance Manual, Detector Kit, Chemical Agent, VGH, AN-M15A2A, sec IV, para 20 thru 26.
TM 3-6665-307-10, Operator's Manual, Detector Kit, Chemical Agent, M256

SQT ADMINISTRATION REQUIREMENTS

M72A1 Simulant, Chemical Agent Identification and Training Set (SCAITS).

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DETERMINE RADIATION READINGS USING AN IM-174 SERIES RADIACMETER

CONDITIONS

Given the mission to monitor for radiation, a calibrated IM-174A/PD or IM-174/PD radiacmeter, and the appropriate batteries as follows:

IM-174A/PD	IM-174/PD
Two batteries BA-1391/U	Two batteries BA-1318/U
Two batteries BA-1396/U	One battery BA-1288/U
Two batteries BA-1006/U	

STANDARDS

Correct reading is determined to ±25% of actual dose rate for the IM-174A and ±35% for the IM-174.

1. PERFORMANCE MEASURES FOR IM-174A/PD

a. Prepare the IM-174A/PD radiacmeter for operation.

(1) Unsnap the snap fasteners and remove the radiacmeter from the carrying case (fig 1).

(2) Set the zero control (fig 2) to OFF.

(3) Unscrew the captive screw on the bottom of the battery cover (fig 3).

(4) Remove the battery cover (fig 3) which contains the battery board assembly.

(5) Carefully lift the top battery contacts for the BA-1006/U (fig 4) and slide the two batteries BA-1006/U into their respective positions so that the polarity marking (+) plus on each battery is down (facing the battery board assembly). Release the battery contacts.

(6) Install the two BA-1391/U batteries following the procedure given in (5) above.

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PERFORMANCE MEASURES (cont)

(7) Carefully insert the two BA-1396//U batteries into their contacts so that the plus polarity marking (+) on each battery coincides with the plus polarity marking (+) on the battery board assembly.

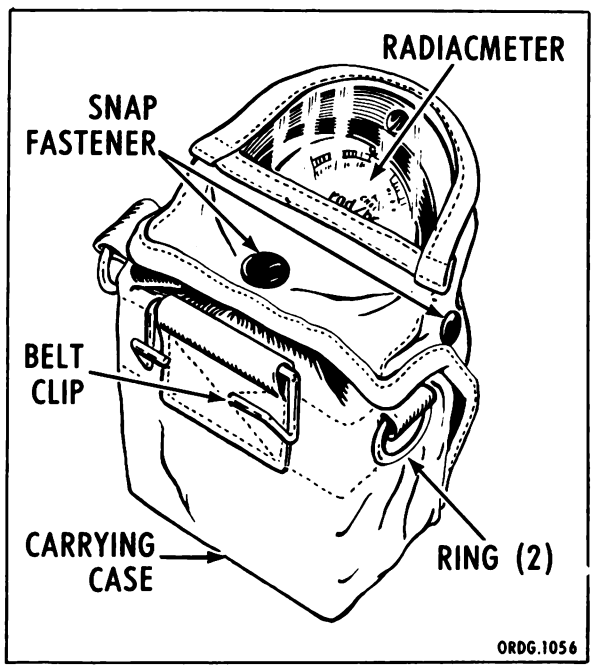

Figure 1.

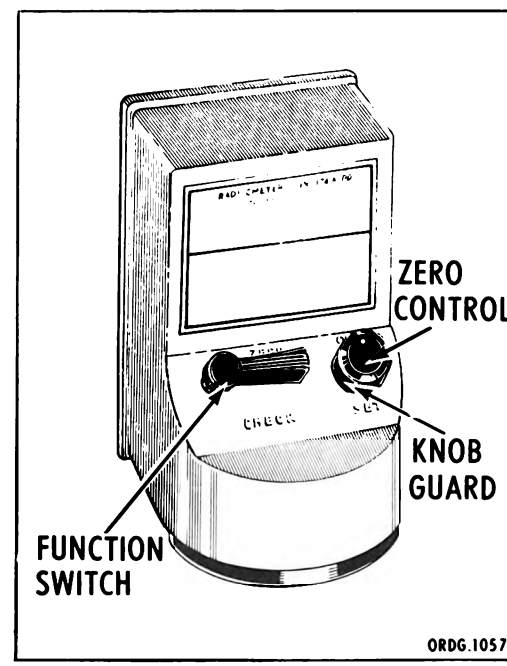

Figure 2.

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PERFORMANCE MEASURES (cont)

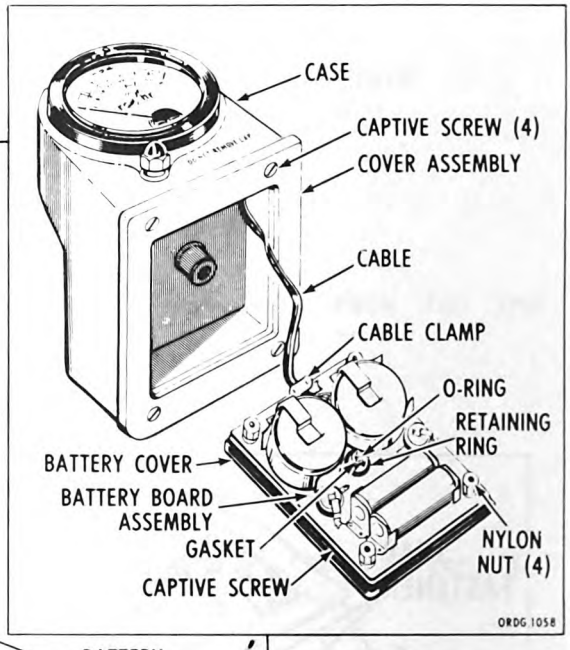

Figure 3.

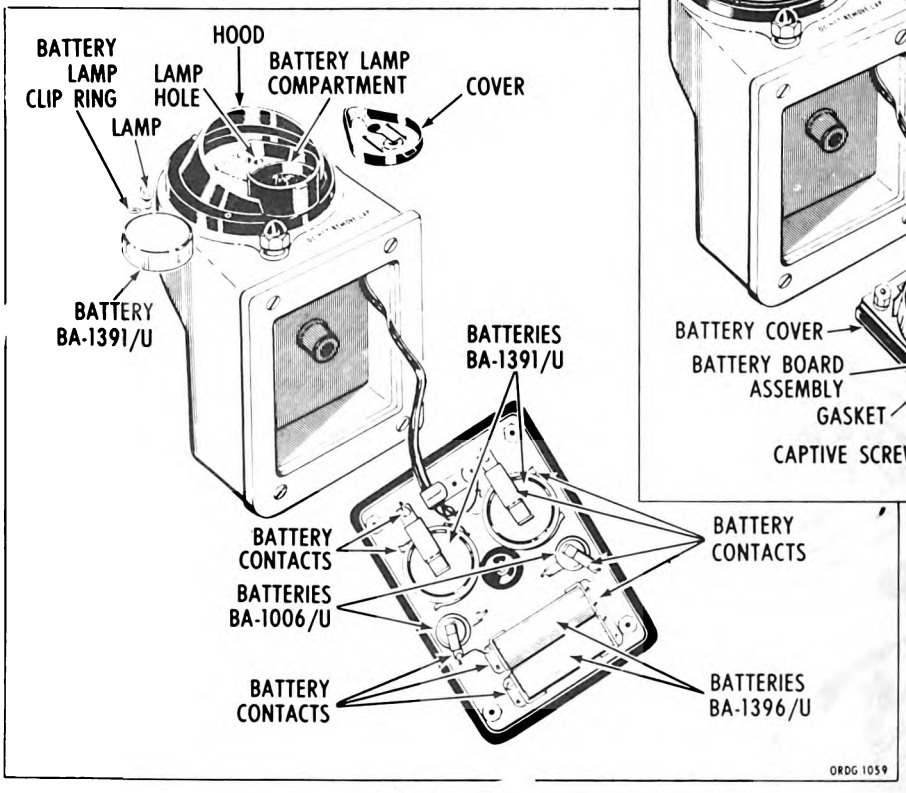

Figure 4.

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PERFORMANCE MEASURES (cont)

(8) Carefully position the battery cover, which contains the battery board assembly, on the cover assembly so that the cable, attached to the battery board assembly (fig 4), is at the rear of the radiacmeter.

(9) Secure the battery cover, which contains the battery board assembly, to the radiacmeter. Tighten the captive screw.

Note. If the radiacmeter contains an instrument light, proceed to step (10) below. If the radiacmeter does not contain an instrument light, proceed to step (15).

(10) Remove the cover from the instrument light (fig 5) by lifting up on the tab (not shown) at the rounded (bottom) end of the cover.

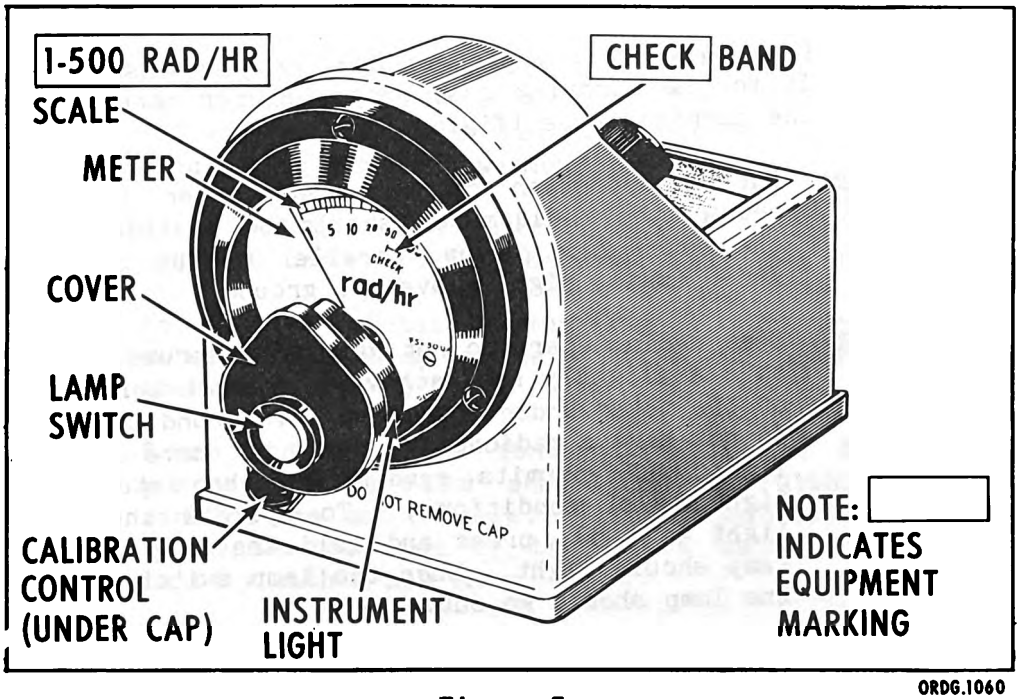

Figure 5.

(11) Remove the battery/lamp clip ring containing the lamp from the battery/lamp compartment (fig 4).

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PERFORMANCE MEASURES (cont)

(12) Install a battery BA-1391/U in the battery/lamp clip ring so that the plus polarity marking (+) on the battery is facing the same direction as the glass portion (not shown) on the lamp.

(13) Insert the battery/lamp clip ring containing the battery and the lamp in the battery/lamp compartment so that the glass portion of the lamp fits into the lamp hole, and the plus polarity marking (+) on the battery is down (facing the meter).

(14) Replace the cover on the instrument light by fitting the pointed end of the cover on the pointed end of the battery/lamp compartment and carefully pressing down on the rounded (bottom end) of the cover (fig 5).

(15) Replace the radiacmeter in its carrying case.

b. Operate the IM-174A/PD Radiacmeter.

(1) Push back the top part of the carrying case, and secure it to the carrying case snap fastener near the rear of the carrying case (fig 6).

Note. During operation of the radiacmeter (2) thru (8) below, the radiacmeter should be positioned so that the meter face is up, parallel to the ground, and 1 meter (waist high) above the ground.

Note. Some radiacmeters do not have an instrument light, but have a slightly radioactive dial that permits reading of the meter under low light level conditions. Others do not have a radioactive dial, but have an instrument light that permits reading of the meter under low light level conditions. To operate the instrument light (fig 5), press and hold the lamp switch. The lamp should light. When the lamp switch is released, the lamp should go out.

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PERFORMANCE MEASURES (cont)

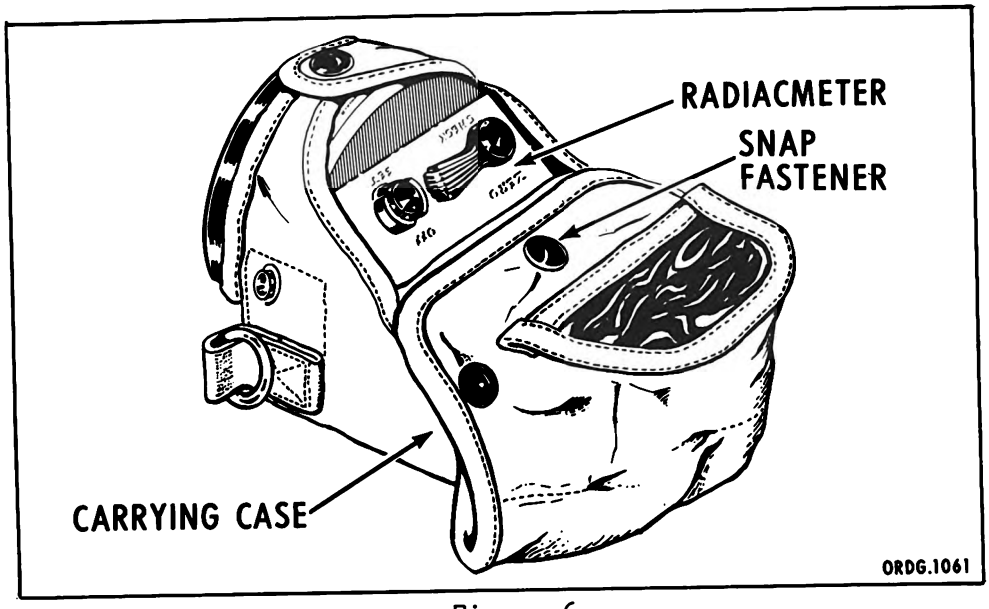

Figure 6.

(2) Turn on the radiacmeter by turning the zero control (fig 2) clockwise from OFF. Allow at least 2 minutes for the radiacmeter to warm up; if time permits, allow 20 minutes for complete warmup.

(3) Press and hold the function switch to ZERO and adjust the zero control until the meter indicates 0 (zero).

(4) Release the function switch (fig 2). The pointer of the meter should swing up-scale to between 5 and 10 RAD/hr, then fall back to 0.

(5) Press and hold the function switch to CHECK. The pointer of the meter should indicate within the CHECK band on the meter scale. (If the pointer of the meter indicates outside of the CHECK band, replace each battery with a new one.

(6) Release the function switch. The pointer of the meter should return to 0.

(7) Unsnap the carrying case snap fastener at the rear of the carrying case. Pull the top part of the carrying case over the top of the radiacmeter and fasten the snap fasteners on the sides and front of the carrying case.

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PERFORMANCE MEASURES (cont)

(8) Measure the radiation dose rate by taking the reading indicated on the 1-500 RAD/hr scale of the meter. Observe the radiation readings through the front clear face of the carrying case.

(9) Report the reading to your supervisor.

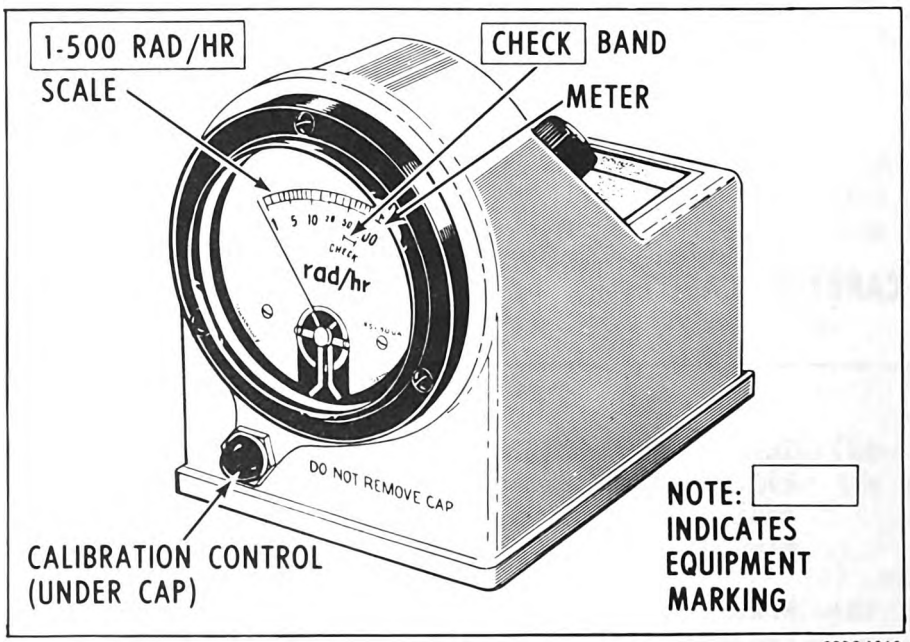

Figure 7.

2. PERFORMANCE MEASURES FOR IM-174/PD

a. Prepare the IM-174/PD for operation.

(1) Unsnap the snap fasteners and remove the radiacmeter from the carrying case.

(2) Loosen the thumbscrew (turn it toward the left) on the battery box from the recess in the bottom cover plate of the radiacmeter. Do not place any excess strain on the cable.

(3) Press down on the lock plate (fig 9), turn it to the left, and lift it off the battery box.

(4) Lift the phenolic retaining plate from the battery box.

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PERFORMANCE MEASURES (cont)

(5) Examine the battery cavities, and clean them, if necessary.

(6) Install BA-1288/U in its cavity in the battery box so that the plus sign (+) faces the center (threaded shaft).

(7) Install each BA-1318/U battery in its respective cavity in the battery box; observe the polarity markings on the bottom of the battery box and on each battery.

(8) Replace the phenolic retaining plate on the battery box. Orient the phenolic retaining plate with the battery box so that the locating pin on the battery box mates with the locating hole on the phenolic retaining plate.

(9) Replace the lock plate. Orient it with the battery box so that the locating hole and locking holes on the lock plate mate with the locating pin and the lock plate screws on the battery box. Press down on the lock plate and turn it to the right until it is secure under the lock plate screws.

(10) Wrap the cable (fig 8) around the battery box. Be sure that the cable is wrapped snugly and flush against the sealing flange (no more than one layer of cable) of the battery box.

CAUTION: Do NOT allow the wrapped cable to slip down into the smaller portion of the recess. The cable might be cut and thereby prevent the radiacmeter from operating when the thumbscrew is tightened.

(11) Carefully replace the battery box in the recess of the bottom cover plate of the radiacmeter. Make sure that the cable is still in place, and then hand-tighten the thumbscrew. Do NOT overtighten the thumbscrew.

(12) Replace the radiacmeter in the carrying case and secure the snap fasteners.

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PERFORMANCE MEASURES (cont)

b. Operate the IM-174/PD.

(1) Unsnap the snap fasteners on the front and sides of the carrying case.

(2) Push back the top part of the carrying case and secure it to the carrying case snap fasteners near the rear of the radiacmeter.

(3) Turn on the radiacmeter by turning the SET control clockwise (just past the click) from OFF. Allow at least 2 minutes for the radiacmeter to warm up.

Note. If time permits, allow 20 minutes for complete warmup.

(4) Hold the function switch at ZERO and adjust the SET control until the pointer on the panel meter indicates 0.

(5) Release the function switch to the CHECK position. The panel meter pointer should give a sudden kick up-scale and then drop back to 0.

(6) Set the function switch to ELEC CAL. The panel meter pointer should indicate 500 RAD/hr. If the pointer does not indicate 500 RAD/hr, remove the cap from the CALIB control (on the right-hand side of the front panel) and adjust the control until the panel meter pointer indicates 500 RAD/hr. Replace the cap on the CALIB control.

Note. This procedure provides an indication that the radiacmeter is probably calibrated. If a panel meter indication of 500 RAD/hr cannot be obtained by adjusting the CALIB control, change the batteries and repeat the procedures given in (3) thru (6) above. If a panel meter indication of 500 RAD/hr still cannot be obtained by adjusting the CALIB control, the radiacmeter is defective and should be turned in for higher category maintenance.

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PERFORMANCE MEASURES (cont)

(7) Hold the function switch in the LINEARITY position. The panel meter pointer should fall within the red mark on the face of the meter.

Note. If the pointer indicates outside the red mark, change the batteries and repeat the procedures given in c thru g above.

(8) Set the function switch to READ. The radiation dose rate will be indicated on the 0-500 RAD/hr scale of the panel meter.

(9) Report the reading to your supervisor.

REFERENCES

TM 11-6665-213-12, Operator and Organizational Maintenance Manual, Radiacmeter IM-174/PD, chap 2, pp 2-4 to 2-8; chap 3, pp 3-6 to 3-10.

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DECONTAMINATE UNIT EQUIPMENT

CONDITIONS

Given unit equipment contaminated with an identified chemical or radiological hazard, the requirement to decontaminate, a work crew, chemical agent detector kit with operator, radiacmeter with operator, DS2, STB, scrubbing/cleaning equipment, and an acceptable level of decontamination established by the commander.

STANDARDS

Equipment must be decontaminated without damage to the level specified by the commander.

PERFORMANCE MEASURES

1. Wear protective clothing. Make sure all personnel performing decontamination are wearing all protective equipment available.

2. Direct decontamination. Direct personnel to decontaminate vehicles/weapons contaminated with chemical or biological agents.

   a. Use the M11 decontaminating apparatus (filled with 1-1/3 quarts of DS2) to decontaminate parts of the vehicle that must be touched during vehicle operation; e.g., steering wheel, seat, gear shift (see Task Summary 031-503-2002, Decontaminate Equipment Using ABC-M11).

   b. Spread STB mixed with dirt (dry mix) under the equipment being decontaminated.

   c. Apply bulk DS2 or STB mixed with water (slurry) with a broom, brush, or any other available swab and leave it on for 30 minutes.

   d. If DS2 or STB are not available, use hot, soapy water, gasoline, or any available solvent. Exercise caution when a flammable substance is used.

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PERFORMANCE MEASURES (cont)

e. Wash with water.

f. Check completeness of decontamination using the chemical agent detector kit (see Task Summary 031-503-3001).

3. Decontaminate vehicles/weapons contaminated with a radiological hazard.

a. Brush loose, dry contamination from the vehicle.

b. Wash with hot, soapy water and scrub the equipment.

4. Decontaminate optical instruments.

a. Blot with rags.

b. Wipe with an organic solvent (lens-cleaning solvent only for the lens).

c. Air the equipment.

5. Decontaminate communication and radar equipment.

a. Wipe metal parts with a rag soaked in DS2.

b. Wipe with clean rags.

c. Air the equipment.

WARNING: STB mixed with DS2 or a liquid blister agent may result in a fire. When STB is mixed with water (slurry) or mixed with dirt (dry mix) it is safe to use with DS2.

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REFERENCES

FM 21-40, NBC Defense, chap 5, pp 5-26 thru 5-32.
TM 3-220 w/C 1 and 2, Chemical, Biological, and Radiological (CBR) Decontamination, chap 1, para 9; chap 2, para 24, app B.

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PREPARE SUPPLIES AND EQUIPMENT FOR NBC ATTACK

CONDITIONS

Your unit is operating in a field location, and opposing forces have the capability of delivering NBC weapons into your area. The commander has directed you to prepare for an attack.

STANDARDS

1. Supplies and equipment are covered to protect against contamination.
2. Supplies and equipment are secured to protect against nuclear blast effects.
3. Electronic equipment is protected against the electromagnetic pulse (EMP).

PERFORMANCE MEASURES

1. Protect supplies and equipment from chemical or biological contamination or fallout.
   a. Cover important items of equipment. Plastic sheets serve as excellent covers because they are nonporous. If plastic material is not available, tarpaulins or other suitable material may be used. If no other cover is available, dense foliage will provide some protection.
   b. Cover ammunition or keep it in its containers as long as possible.
   c. Cover weapons or disperse under foliage when possible.
   d. Keep instruments, such as those used for fire control, in their containers when not being used.

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PERFORMANCE MEASURES (cont)

e. Locate vans to take advantage of any available natural shielding. If possible, locate vans so that the air conditioners are opposite the prevailing wind direction. Personnel responsible for the operation of the vans should make every effort possible to reduce leakage in vans and components such as the air conditioners.

f. Locate vehicles in woods or under bushes, or disperse and cover if possible.

g. Cover communication equipment not housed in shelters. Protect the headsets on radios and the mouthpieces on telephones from contamination by covering them with plastic.

h. Provide overhead cover for field latrines.

i. Keep food packages sealed until ready for consumption.

j. Store unpackaged food in field iceboxes and refrigerators (sealing gaskets must be serviceable).

k. Keep water in sealed containers.

2. Protect supplies and equipment from nuclear attack.

a. Disperse supplies and equipment, particularly explosives and flammables.

b. Dispose of debris.

c. Secure loose items to prevent them from becoming missiles.

d. Store supplies and equipment below ground level (dig in when possible). Considering mission requirements, turn off electronic equipment, remove power cables and antennas, and locate the equipment inside bunkers and armored vehicles to protect against EMP.

REFERENCES

FM 3-12 w/C 1 and 2, Operational Aspects of Radiological Defense, chap 3, sec IV, pp 3-7 thru 3-9.
FM 21-40, NBC Defense, chap 3.

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IMPLEMENT MISSION-ORIENTED PROTECTIVE POSTURE (MOPP)

CONDITIONS

Given the commander's guidance for MOPP, and all authorized chemical protective clothing and equipment.

Note. There are several different levels of MOPP and, depending on unit SOP, they may be lettered, numbered, or titled sequentially. The lowest level of MOPP, however, requires the individual to wear his protective clothing and carry his gloves, overboots, and mask with hood. Table 1 gives examples of the various levels of MOPP, as determined by work rate and temperature. Notice the examples of work rate levels at the bottom of the table.

STANDARDS

1. Personnel must follow the guidance for MOPP.
2. Stress and fatigue are minimized.

PERFORMANCE MEASURES

1. Check your soldiers for:
   a. Proper fit and seal on the protective mask (see Task Summary 031-503-3012, Supervise the Fitting of Protective Mask).
   b. Proper fit of protective clothing. Require the soldiers to assume "stressed" positions such as bending, twisting, and stretching (see Task Summary 031-503-1015, Put on and Wear Protective Clothing).
   c. Compliance with the MOPP level specified.
2. Reduce stress and fatigue by:
   a. Rotating heavy work among individuals.
   b. Allowing more frequent rest periods.
   c. Making maximum use of mechanical aids.

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PERFORMANCE MEASURES (cont)

d. Providing adequate water supply.

Table 1.

WORK RATE*	TEMPERATURE RANGE		
	Cool (50°-70° WBGT)	Warm (70°-85° WBGT)	Hot (85°-100° WBGT)
Low	Wear full protective clothing and equipment.	Progressively open mask, hood, and clothing.	Remove and carry mask, hood, and gloves. Remove some protective clothing or duty uniform.
Moderate	Wear full protective clothing and equipment.	Remove and carry mask, hood, and gloves. Open protective clothing and duty uniform.	Remove and carry mask, hood, and gloves. Remove some protective clothing or duty uniform.
Heavy	Remove and carry mask, hood, and gloves. Progressively open and/or remove some protective clothing or duty uniform.	Remove and carry mask, hood, and gloves. Remove some protective clothing or duty uniform.	Remove and carry mask, hood, and gloves. Remove protective clothing or duty uniform.

*EXAMPLES:

Low: Motorized movement or administrative work.

Moderate: Improvement of defensive position or reserve position activity.

Heavy: Infantry dismounted assault or forced march.

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REFERENCES

FM 21-40, NBC Defense, chap 5, pp 5-5 thru 5-17.

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SUPERVISE THE FITTING OF PROTECTIVE MASK

CONDITIONS

Your unit has been alerted for deployment to an area where chemical or biological weapons may be used, given protective masks in small, medium, and large sizes, and personnel to be fitted.

STANDARDS

All individuals are properly fitted (fig 1).

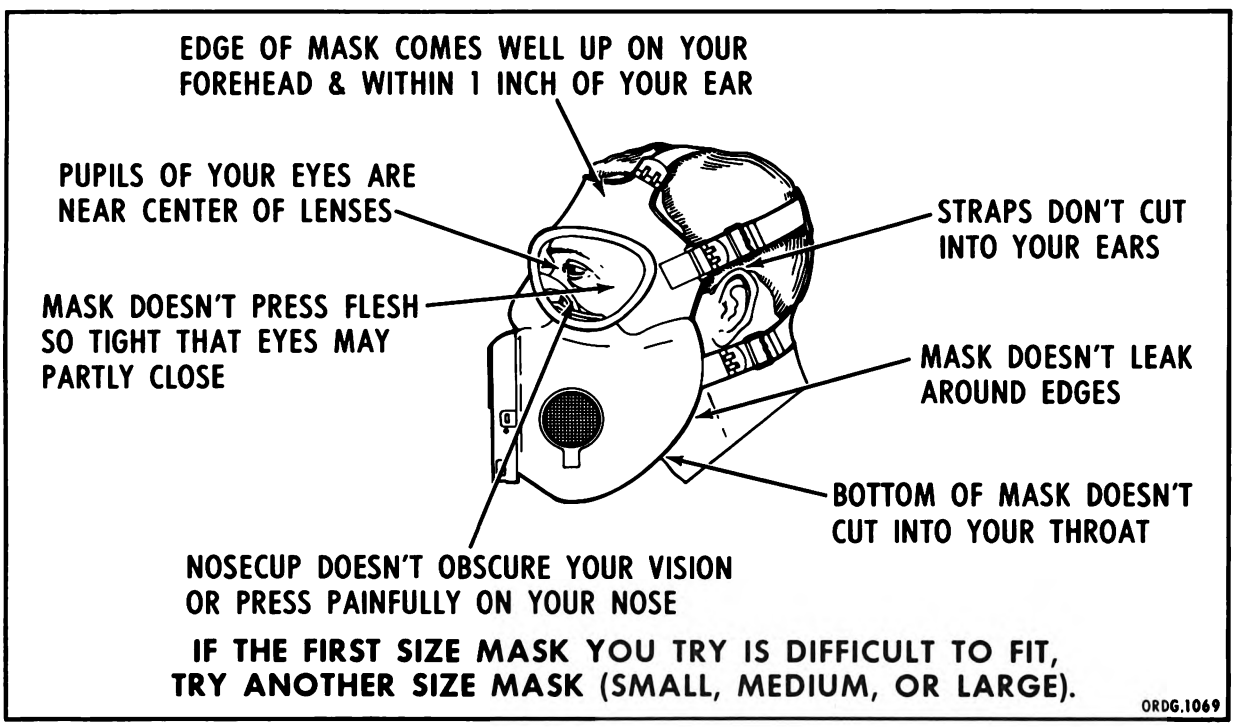
EDGE OF MASK COMES WELL UP ON YOUR FOREHEAD & WITHIN 1 INCH OF YOUR EAR
PUPILS OF YOUR EYES ARE NEAR CENTER OF LENSES
MASK DOESN'T PRESS FLESH SO TIGHT THAT EYES MAY PARTLY CLOSE
STRAPS DON'T CUT INTO YOUR EARS
MASK DOESN'T LEAK AROUND EDGES
BOTTOM OF MASK DOESN'T CUT INTO YOUR THROAT
NOSECUP DOESN'T OBSCURE YOUR VISION OR PRESS PAINFULLY ON YOUR NOSE
IF THE FIRST SIZE MASK YOU TRY IS DIFFICULT TO FIT, TRY ANOTHER SIZE MASK (SMALL, MEDIUM, OR LARGE).
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Figure 1.

PERFORMANCE MEASURES

1. Fit the mask by having each individual:

    a. Hold the mask firmly against the chin with one hand.

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PERFORMANCE MEASURES (cont)

b. **Center the** head harness pad in the middle of the back of the **head. Hold** the pad in place with the other hand.

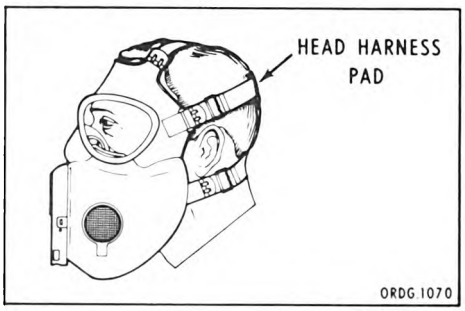

Figure 2.

c. **Remove the** hand from the chin position and adjust the **forehead straps** with a jerking pull.

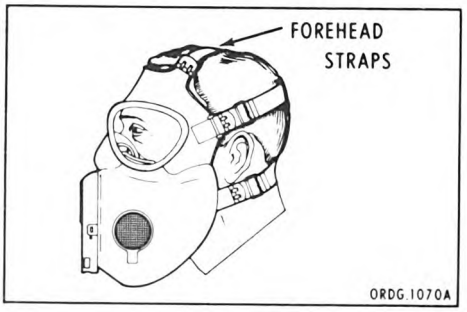

Figure 3.

d. **Tighten** each cheek strap until the straps are moderately and **evenly tightened.**

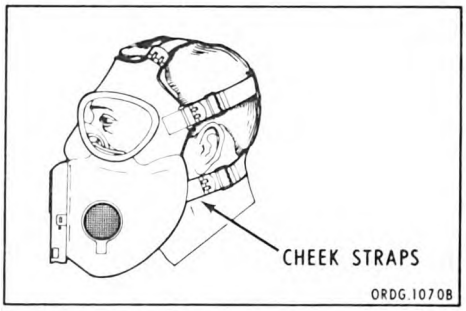

Figure 4.

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PERFORMANCE MEASURES (cont)

e. Remove the hand from the head harness pad and adjust the temple straps so that they are fairly tight. Temple straps should be above the ears. Buckles should lie flat and straps should form a straight line with the tabs.

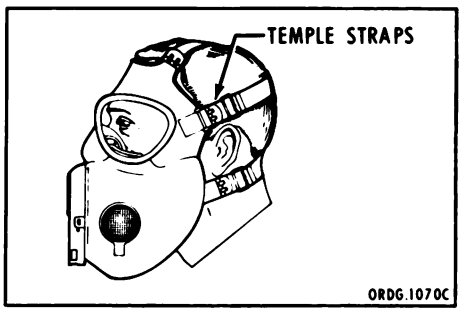

Figure 5.

2. Inspect each individual to check the fit.

a. Check to see that the pupils of his eyes are near the center of the lenses.

b. Make sure the edge of the mask fits well upon the forehead and within 1 inch of the ear.

c. Check the straps to make sure they are straight, not twisted and do not cut into the ears.

d. Ask the individual if the mask cuts or presses into his skin.

e. Have each individual cover the inlet valves with his hands and breath in. If the mask draws in against his face, it does not leak.

f. If the mask meets each performance measure (2a thru 2e above), it fits. If it does not, fit it again. If it still does not meet the performance measures, try another size.

REFERENCES

FM 21-41, Individual NBC Defense, pp 27 thru 29.

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EMPLACE AUTOMATIC CHEMICAL AGENT ALARM SYSTEM

CONDITIONS

In an area where chemical agents could be employed, given the automatic chemical agent alarm system, as much telephone cable (WD-1) as required, and the requirement to set up the system for stationary or mobile operations.

STANDARDS

1. The system is emplaced for stationary operation so that the detector unit is oriented upwind of the position being protected and at an optimum distance (normally 150 meters) from the unit location being protected.

2. The system is emplaced for mobile operation with the advance, rear, and upwind flank security elements.

PERFORMANCE MEASURES

1. Emplace the alarm system for stationary operation.

   a. Determine the wind direction.

   b. Position the available detector units upwind of the nearest position to be protected. The optimum distance is considered to be 150 meters. The actual location of detectors must consider:

      (1) The mission-oriented protective posture (MOPP) of the unit. The higher the protective posture, the closer the detectors may be placed.

      (2) The terrain. The more broken the terrain, the closer the detectors should be placed.

      (3) The delivery threat. If the major danger is direct (on-target) attack, place the detectors closer.

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PERFORMANCE MEASURES (cont

c. Space the available detector units approximately 300 meters apart. (Figures 1 and 2 give examples of a six- and four-detector array.)

d. Make sure each detector unit is connected to an alarm unit with telephone cable (WD-1).

e. Position the alarm units near radio/telephone communications to facilitate alerting the unit in the event of attack. Don't remote the alarms more than 400 meters from the detectors.

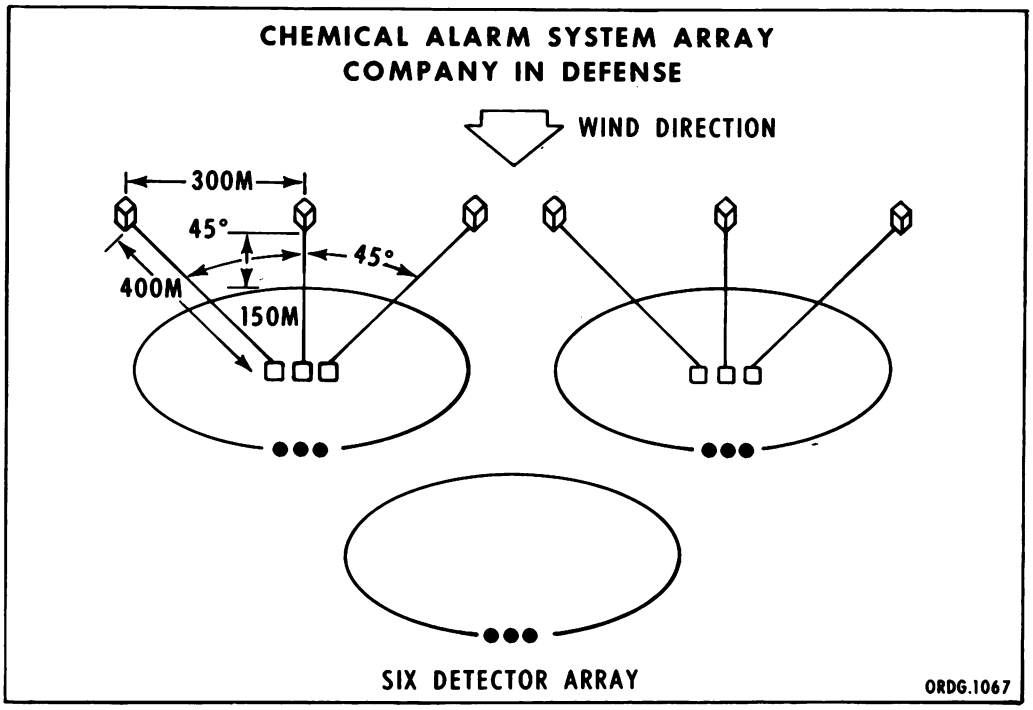

Figure 1.

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PERFORMANCE MEASURES (cont

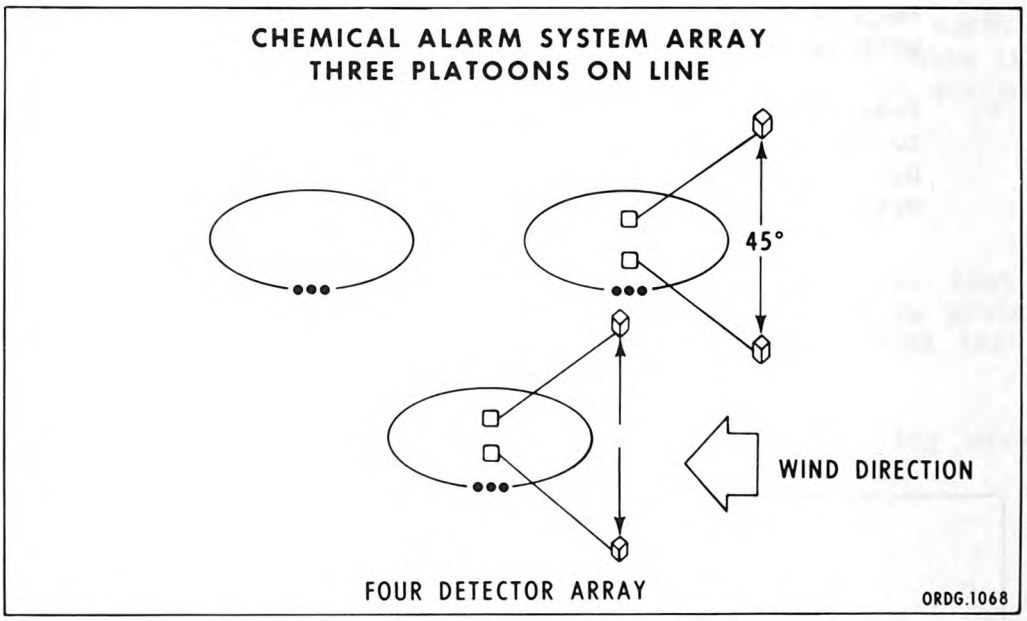

Figure 2.

2. Emplace the alarm system for mobile operations.

   a. Determine the wind direction.

   b. Dependent on the number of systems available, position the systems with the advance, upwind, and rear security elements, in that order of priority.

   c. Direct the personnel close to the alarm to assume an increased protective posture due to the very short warning time. When actually moving, all personnel should be in maximum protection.

REFERENCES

FM 21-40, NBC Defense, app B, pp B-12 and B-13.
TM 3-6665-225-12 w/C 1, Alarm, Chemical Agent, Automatic: Portable, chap 3, p 3-3.

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PREPARE AND SUBMIT AN NBC-4 REPORT

CONDITIONS

Following a nuclear attack, given the mission to report information on dosage rates, time and location of readings; the format for an NBC-4 report (fig 1); tactical radio; and paper and pencil.

LETTER	MEANING	EXAMPLE
	Precedence	
	Date/time (local or ZULU time, state which)	
	Security classification	
	From	
	To	
	Type of report	NBC-4 (NUCLEAR)
Q.	Location of reading (UTM)	Q. LB 123987
R.	Dose rate (rad/hr)	R. 35 INITIAL
	The words "initial," "increasing," "peak," or "decreasing" may be added.	
S.	Date/time of reading (local or ZULU, state which):	S. 201735 (local)

Figure 1.

STANDARDS

1. Prepare an accurate NBC-4 report.
2. Transmit the information in the report accurately to your supervisor or higher headquarters.

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PERFORMANCE MEASURES

1. For each reading taken:

   a. Record the location of reading as letter item Q in the NBC-4 format.

   b. Record the dose rate reading as letter item R in the NBC-4 format.

   c. Record the date/time of reading as letter item S in the NBC-4 format.

2. If required, assign and record the precedence of the report. (For the initial detection assign an IMMEDIATE precedence.)

3. Transmit this report to your supervisor or to higher headquarters.

4. Submit subsequent NBC-4 reports:

   a. From locations deemed critical by the commander.

   b. As the dose rate is rising.

   c. At the first indication that the dose rate is declining.

   d. As directed by the commander.

REFERENCES

FM 21-40, NBC Defense, chap 6, pp 6-20 and 6-21.

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CONDUCT A PERFORMANCE-ORIENTED TRAINING SESSION

CONDITIONS

Given:

1. A task to be trained, having the following characteristics:
   a. It must be an individually-performed task.
   b. It must not require the mastery of any intermediate task.
   c. It must be teachable within 30 minutes and judged by an individual (your evaluator/supervisor) who has demonstrated mastery of the task.
2. No more than 24 hours to prepare the training session.
3. No more than 10 or less than 5 individuals, who are unable to perform the task.
4. No more than 30 minutes to conduct the training session.
5. All other necessary resources (training aids, an area to conduct the training, etc.) to conduct the training.

STANDARDS

Training must be conducted so that at least 80% of the students can accomplish the task trained to the standards specified for the task.

PERFORMANCE MEASURES

1. Make sure you clearly understand the task you are to teach. If you have any questions, ask your supervisor.
   a. Phase I. Explain the task and ask the trainees if they understand the task, and the conditions they are expected to perform at the end of the session, the conditions under which they must operate (for example, equipment given or denied and terrain), and the standard they must achieve. Estimate the time it will take to complete phase I.

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PERFORMANCE MEASURES (cont)

b. Phase II. Allow the trainees to practice the task. (Do not estimate the amount of time required for this phase at this time.)

c. Phase III. Test the trainees to determine if each one can perform the task. Estimate the time that it will take to test all trainees. All remaining time will be allocated to phase II of the training session. If you properly organize available time, all trainees should be able to accomplish the task within the time estimated.

2. Obtain any training aids you need. (See FM 21-6, app C, Training Techniques, Aids, and Devices.) If the task you have been given is contained in the Skill Level 1 Soldier's Manual, the "performance measures" portion of the task summary should also give you some helpful information.

3. Rehearse the training session.

4. Conduct the training session in three phases, as described above.

5. Evaluate the results of the training session. Remember that all trainees must perform the task and that it is critical to identify those who cannot. Note the reason(s) for any failure(s). Reasons for failure might be insufficient resources (time, training aids, etc.), unrealistic standards, or lack of trainee motivation.

6. Provide remedial training as appropriate.

REFERENCES

FM 21-6, How to Prepare and Conduct Military Training, chap 3, pp 8 thru 26.
TEC 901-071-0091-F, Unit Development and Training, Part 1.
TEC 901-071-0092-F, Unit Development and Training, Part 2.

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APPENDIX A

CONSOLIDATED LIST OF REFERENCES

MOS 19D1/2

This list of references includes all material cited in Soldier's Manuals for MOS 19D, Skill Levels 1 and 2. Changes to these publications and current publication dates can be found in the DA Pam 310 series. Reference changes which substantially alter the task summaries contained in your Soldier's Manuals will be published as a part of your SQT notice.

FIELD MANUALS (FM)

3-12	Operational Aspects of Radiological Defense.
5-20	Camouflage.
5-25	Explosives and Demolitions.
5-34	Engineer Field Data.
5-36	Route Reconnaissance and Classification.
6-30	The Field Artillery Observer
6-40	Field Artillery Cannon Gunnery.
7-7	The Mechanized Infantry Platoon and Squad (How to Fight).
17-12	Tank Gunnery.
17-12-5	Tank Gunnery for M551 Sheridan.
17-95	Cavalry.
20-22	Vehicle Recovery Operations.
20-32	Mine/Countermine Operations at the Company Level.
21-6	How to Prepare and Conduct Military Training.
21-11	First Aid for Soldiers.
21-20	Physical Readiness Training.
21-26	Map Reading.
21-40	NBC Defense
21-41	Individual NBC Defense
21-60	Visual Signals.
21-75	Combat Training of the Individual Soldier and Patrolling.
21-305	Manual for the Wheeled Vehicle
22-6	Guard Duty.
23-9	M16A1 Rifle and Rifle Marksmanship
23-23	Antipersonnel Mine M18A1 and M18 (Claymore).
23-31	40mm Grenade Launcher, M203 and M79.
23-33	66mm Heat Rocket M72A1, M72A1E1, and M72
23-35	Pistols and Revolvers.
23-65	Browning Machinegun, Caliber .50 HB, M2.
23-67	Machinegun 7.62-mm, M60.
23-91	Mortar Gunnery.
24-18	Field Radio Techniques.
24-20	Field Wire and Field Cable Techniques.
31-70	Basic Cold Weather Manual.

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44-1	US Army Air Defense Artillery Employment.
71-1	Tank and Mechanized Infantry Company Team.
71-2	The Tank and Mechanized Infantry Battalion Task Force

TRAINING CIRCULARS (TC)

1-88	Aviator's Recognition Manual.
3-3	How to Use the Automatic Chemical-Agent Alarm.
6-40-4	Fire for Effect.
21-26	Don't Get Lost.
23-11	Starlight Scope Small Hand-held or Individual Weapons Mounted Model Number 6060.
23-13	Crew-Served Weapon, Night Vision Sight.
23-24	Assault Weapon System, M47 (DRAGON).
24-3	Radio Wire Integration, Installation and Operation Tips.
30-3	Soviet Equipment Recognition Guide.
44-30	Aircraft Recognition Training in Ground Observers

TRAINING EXTENSION COURSES (TEC)

201-113-4501-F	Preparation of AN/PRC-77 for Operation, Part 1: Installlation.
201-113-4502-F	Preparation of AN/PRC-77 for Operation, Part 2: Operation Checks.
201-113-4503-F	Preparation of AN/PRC-77 for Operation, Part 3: Pre-sets.
201-113-4545-A	Maintenance of Circuit Log and Operator Number Sheet.
201-113-4550-E/A	Calling and Answering, Part 1.
201-113-4551-E/A	Calling and Answering, Part 2.
201-113-4552-E/A	Establishing a Net.
201-113-4553-E/A	Authentication.
201-113-4554-E/A	Opening a Net.
201-113-4555-E/A	Free and Directed Net.
201-113-4556-E/A	Message Format, Part 1.
201-113-4557-E/A	Message Format, Part 2.
510-091-6456-F	Preparing and Using DA Form 2404, Part 1.
510-091-6472-F	Preparing, Consolidating, and Maintaining DA Form 2408-1.
510-091-6474-F	Preparing, Maintaining and Using DA Form 2408-14.
645-093-7321-F	Prepare Electric Firing System.
901-071-0091-F	Unit Development and Training, Part 1.
901-071-0092-F	Unit Development and Training, Part 2.
910-171-0014-F	PM--High Density Item--Optical Equipment.
930-071-0013-F	Introduction to Land Navigation.
930-071-0016-F	Terrain Features.
930-071-0018-F	Navigating with Map and Compass.
931-061-0060-F	NBC: The Mask.
931-061-0061-F	NBC: Masking and When To Do It.

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931-061-0065-A	NBC: Maintenance of the M17-Series Mask.
931-171-0301-F	Prepare M60-Series Tank or M551 ARAAV for NBC Attack, Part 1.
931-171-0302-F	Prepare M60-Series Tank or M551 ARAAV for NBC Attack, Part 2.
935-071-1026-F	Collecting and Recording Information.
935-071-1029-F	Counterintelligence.
935-071-1038-F	Processing Captured Personnel, Equipment, and Documents.
935-171-0201-F	Armor Vehicle Recognition, Part 1.
935-171-0202-F	Armor Vehicle Recognition, Part 2.
935-171-0203-F	Armor Vehicle Recognition, Part 3.
936-061-0108-F	Radiotelephone Procedures, Part 1: Initiating and Responding to Radio Calls.
936-061-0109-F	Radiotelephone Procedures, Part 2: Writing Down Messages Received by Radio.
936-061-0110-F	Radiotelephone Procedures, Part 3: Responding to Messages.
936-061-0111-F	Radiotelephone Procedures, Part 4: Preparing Messages To Be Sent.
936-061-0112-F	Radiotelephone Procedures, Part 5: Sending and Receiving Messages.
936-061-0113-F	Radiotelephone Procedures, Part 6: Entering and Leaving a Radio Net and Authenticating.
936-061-0114-F	Radiotelephone Procedures, Part 7: Practice and Self-Evaluation.
936-061-0137-A	(To be published).
936-061-0147-F	Visual Hand Signals.
937-061-0030-F	Cover, Camouflage, and Concealment, Part 1.
937-061-0032-F	Cover, Camouflage, and Concealment, Part 3.
939-071-0009-F	Loading and Unloading the M16A1 Rifle.
939-071-0010-F	Disassembly and Assembly of the M16A1 Rifle.
939-071-0012-F	Preventing and Correcting Common Malfunction.
940-071-0086-F	M203 Grenade Launcher: Disassembly, Assembly, and Maintenance.
940-071-0088-F	M203 Grenade Launcher: Zeroing and Target Engagement.
941-071-0116-F	The Caliber .50 Machinegun: Mechanical Training.
941-071-0117-F	The Caliber .50 Machinegun: Headspace Training.
941-071-0078-F	Machinegun Training, M60, Part I.
941-071-0079-F	Machinegun Training, M60, Part II.
941-071-0080-F	Machinegun Training, M60, Part III.
941-071-0081-F	Machinegun Training, M60, Bipod Emplacement and Tripod Mounting.
941-071-0083-F	Machinegun Training, M60, Bipod Emplacement and Tripod Mounting: Prefire Procedures .
941-071-0084-F	Firing and Zeroing, M60 Machinegun.
941-071-0085-F	Malfunctions and Stoppages, M60 Machinegun.
941-071-0127-F	Target Engagement--Limited Visibility, M60 Machinegun, Part 1.

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941-071-0128-F	Target Engagement--Limited Visibility, M60 Machinegun, Part 2.
944-171-0019-F	Recovery Operations.
947-071-0106-F	Claymore Mines: Introduction, Circuit Testing, and Emplacement.
947-071-0107-F	Electrical Arming and Firing.
947-071-0108-F	Non-Electrical Arming and Firing.
947-071-0109-F	Disarming, Recovery, and Emergency Destruction Procedures.
947-071-0110-F	Multiple Emplacement and Review.
948-071-0005-F	Operating the M72A2 LAW.
949-061-0001-F	Determination of Direction.
949-061-0002-F	Target Location: Polar Plot and Grid Coordination Methods.
949-061-0003-F	Locate a Target by Shift from a Known Point.
949-061-0004-F	The Call for Fire (rev).
949-061-0005-F	Adjustment of Field Artillery Fire, Bracketing and Creeping, Part 1.
949-061-0006-F	Adjustment of Field Artillery Fire, Bracketing and Creeping, Part 2.
952-061-0050-F	Expedient Early Warning Devices.
952-061-0054-F	Early Warning Devices: Electronic, Part 1.
952-061-0055-F	Electronic Early Warning Devices.
953-071-0061-F	AN/PVS-2 Starlight Scope.
954-441-0047-F	Wing, Engine, Fuselage, Tail (WEFT) Characteristics.
954-441-0049-F	Mirage III, F104, MiG-23/27, A-10, AV-8.
954-441-0050-F	OH-58, AH-1, Mi-6, Mi-4, UH-1.
954-441-0051-F	MiG-21, Jaguar, SU-17/20, MRCA, Su-19.
954-441-0052-F	Mi-24, Mi-8, C-130, AN-12, CH-47.
954-441-0053-F	Su-78, MiG-17, 1-4, I1-28, C-91.
954-441-0054-F	F-5, F-4, F-111, A-7, F-105.
954-441-0056-F	V-15, F-14, OV-10, Allouette III, Mirage F-1.
954-441-0057-F	SA-341, Scout, PUMA, LYNX, BO-105.
954-441-0058-F	Alpha Jet, F-16, OV-1, Buccaneer, A-6.
954-441-0059-F	SAAB-105, SAAB-37, YAK-28, Lightning Hunter.
954-441-0065-F	Self-evaluation, Part I.
954-441-0066-F	Self-evaluation, Part II.

ARMY CORRESPONDENCE COURSE PROGRAMS (ACCP)

SSO 470	The CEOI.
SS9 735	Operation of Radio Set AN/PRC-77 (SOJT).

TECHNICAL MANUALS (TM)

3-220	Chemical, Biological, and Radiological (CBR) Decontamination.

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3-4230-204-12&P	**Operator's and Organizational Maintenance Manual (Including Repair Parts and Special Tools List) for Decontaminating Apparatus, Portable, DS2 1 1/2 Qt, ABC-M11.**
3-4240-279-10	Operator's Manual: Mask, Chemical-Biological, Field ABC-M17/M17A1, and Accessories.
3-4240-280-10	Operator's Manual for Mask, Biological and Chemical, Aircraft M24, and Mask, Biological and Chemical, Tank, M25 and M25A1, and Accessories.
3-6665-225-12	Operator's and Organizational Maintenance Manual: Alarm, Chemical-Agent, Automatic: Portable, Manpack.
3-6665-253-12	Operator's and Organizational Maintenance Manual: Detector Kit AN-M15A2A.
3-6665-307-10	Operator's Manual, Detector Kit, Chemical-Agent M256.
5-700	Field Water Supply.
5-5420-202-10	Operator's Manual for Launcher, M60A1 Tank Chassis Transporting for Bridge, Armored-Vehicle-Launcher; Scissoring Type, Class 60, NSN 5420-00-889-2020.
5-6350-249-12	Operator and Organizational Maintenance Manual Including Repair Parts and Special Tools List: Alarm Set, Anti-Intrusion, Restricted Area, AN/GSQ-151 (Dorsett Electronics models (PSID)), FSN 6350-179-1557 93A421-1, FSN 6350-179-1847 93A421-2, FSN 6350-179-1847, 93A421-2. FSN 6350-179-1848 93A421-3, FSN 6350-179-1849 93A421-4, FSN 6350-179-50-179-1850 93A421-5, 6350-179-1851 93A421-6, FSN 6350-240-8767 93A421-7, FSN 6350-240-8800 93A421-8, FSN 6350-240-8813 93A421-9, FSN 6350-240-8825 93A421-10.
5-6665-202-13	Operator, Organizational, and Direct Support Maintenance Manual: Detecting Set, Mine; Aural Indication: 10v, DC Operating Power; Portable Transistorized, w/case AN/PSS-11 (Polan models P153 and P158) FSN 6665-966-9071, (Polan model P190) FSN 6665-181-0432, (Oregon Technical Products Model MD-M), FSN 6665-966-0972, (The VP Company model VP200) FSN 6665-144-7655, (Fourdee model 4D5000) FSN 6665-181-0369.
5-6665-292-13	Operator, Organizational and Direct Support Maintenance Manual: Mine Detecting Set, AN/PRS-7, w/C.
5-6665-293-13	Operator, Organizational, and Direct Support Maintenance Manual: Detecting Set, Mine; Portable; Metallic and Non-Metallic, AN/PRS-7; Litton Systems model NMN, NSN 6665-00-179-5120, and Fourdee model 4D600, NSN 6665-00-138-7998.
9-243	Use and Care of Handtools and Measuring Tools.

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9-1005-213-10	Operator's Manual: Machine Gun, Cal .50; Browning, M2, heavy Barrel, Flexible, w/e (1005-322-9715); Mount, Tripod, Machine Gun, Cal .50, M3, w/e (1005-322-9716); Mount, Machine Gun, Anti-Aircraft, Cal .50, M63 w/e (1005-673-3246).
9-1005-249-10	Operator's Manual: M16A1 Rifle.
9-1010-221-10	Operator's Manual: 40-mm Grenade Launcher, M203.
9-1310-202-12	Operator and Organizational Maintenance Manual: Cartridges 40-mm, M386, M441 and M397.
9-1345-203-12&P	Land Mines.
9-1425-470-12	Operational and Organizational Maintenance for TOW.
9-1425-480-10	Operator's Manual, M47 Dragon Weapon System.
9-2300-257-10	Operator's Manual: Carrier, Personnel, Full Tracked, Armored, M113A1, 2350-968-6321; Carrier, Command Post, Light, Tracked, M77A1 2320-056-6808; Carrier, Mortar, 107-mm Self-Propelled, M106A1, 2350-076-9002; Carrier, Mortar, 81-mm, Self-Propelled, M125A, 2350-071-0732; Carrier, Flame Thrower, Self-Propelled, M132A1, 2350-056-6809; Recovery Vehicle, Full Tracked, Light Armored, XM806E1 2350-808-6104.
9-2320-218-10	Operator's Manual: M151 1/4-Ton Truck.
9-2350-215-10	Operator's Manual for Tank, Combat, Full Tracked: 105-mm Gun, M60A1 w/e (2350-756-8497); Tank, Combat, Full Tracked: 105-mm Gun, M60 w/e (2350-678-5773).
9-2350-230-20	Operator's Manual for M551.
9-2350-232-10	Operator's Manual for Tank, Combat, Full Tracked: 152-mm Gun/Launcher, M60A2, w/e (2350-930-3590).
9-2350-253-10	Operator's Manual for M60A3.
9-2350-258-10	Operator's Manual for Tank, Combat, Full Tracked: 105-mm Gun, M48A5.
10-277	Protective Clothing: Chemical Operations.
11-5805-201-12	Operator and Organizational Maintenance Manual, Including Repair Parts and Special Tool Lists: Telephone Set TA-312/PT (TO 31W1-2PT-291).
11-5805-243-12	Operation and Organizational Maintenance: Telephone Set TA-1/PT (TO 31W1-2PT-421).
11-5820-667-12	Operator's and Organizational Maintenance Manual (Including Repair Parts List) Radio Set AN/PRC-77.
11-5820-401-10-2	Radio Sets, AN/VRC-12, AN/VRC-46, and AN/VRC-47.
11-5820-401-12	Operator's and Organizational Maintenance Manual, Including Repair Parts and Special Tools Lists: Radio Sets AN/VRC-12 (5820-00-223-7412), AN/VRC-43, (5820-00-223-7415), AN/VRC-44, (5820-00-223-7417), AN/VRC-45, (5820-00-223-7418), AN/VRC-46, (5820-00-223-7433) AN/VRC-47, (5820-00-223-7434) AN/VRC-48, (5820-00-223-7435), AN/VRC-49, (5820-00-223-7437), AN/VRC-54, (5820-00-223-7567), and AN/VRC-55 (5820-00-402-2265); Mounting

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	MT-1029/VRC (5820-00-893-1323) and Mounting MT-1898/VRC (5820-00-893-1324); Antenna AT-912/VRC (5820-00-897-6357); Control, Frequency Selector C-2742/VRC (5820-00-892-3343) and Control, Radio Set C-2299/VRC (5820-00-892-3340).
11-5820-477-12	Operator's and Organizational Maintenance Manual: Radio Set Control Groups AN/GRA-39, AN/GRA-39A, and AN/GRA-39B.
11-5820-498-12	Operator's and Organizational Maintenance Manual, Including Repair Parts and Special Tools Lists: Radio Sets AN/VRC-53, AN/VRC-64, AN/GRC-125, and AN/GRC-160, and Amplifier-Power Supply Groups OA-3633/GRC and OA-3633A/GRC.
11-5820-667-12	Operator's and Organizational Maintenance Manual, Including Repair Parts Lists: Radio Set AN/PRC-77 (Including Receiver-Transmitter, Radio RT-841/PRC-77).
11-5850-228-13	Operator's Manual: Night Vision Sight, AN/TVS-4.
11-5855-202-13	Operator's Manual: Night Vision Sight, AN/TVS-2.
11-5855-203-13	Operator's Manual: Night Vision Sight, AN/PVS-2.
11-5855-203-10;23P	Operator's Manual: Night Vision Sight, AN/PVS-2
11-6665-213-12	Operator and organizational Manual: Radiacmeter IM-174/PD.
11-6665-214-10	Operator's Manual: Radiacmeters IM-9E/PD, IM-93/UD, IM-93A/UD, and IM-147/PD.
21-306	Manual for the Tracked Combat Vehicle Driver.
38-750	The Army Maintenance Management System (TAMMS).

LUBRICATION ORDERS (LO)

5-5420-202-12-1	Launcher, M60A1 Tank Chassis, Transporting for Bridge, Armored Vehicle Launched, Scissoring Type, Class 60.
9-2300-257-12	Carrier, Personnel, Full-Tracked, Armored: M113A1 (2350-968-6321); Carrier, Command Post, Light, Tracked, M577A1 (2350-056-6808); Carrier Mortar, 107-mm, Self-Propelled, M106A1 (2350-076-9002); Carrier, Mortar, 81-mm Self-Propelled: M123A1 (2350-071-0732); Carrier, Flame Thrower, Self-Propelled; M132A1 (2350-056-6809); Recovery Vehicle, Full-Tracked, Light, Armored, XM806E1 (2350-800-6104).
9-2350-215-12	Tank, Combat, Full-Tracked: 105-mm Gun, M60A1; and Tank, Combat, Full-Tracked: 105-mm Gun, M60.
9-2350-230-12	Armored Reconnaissance/Airborne Assault Vehicle: Full-Tracked, 152-mm, M551 (2350-00-873-5408) and M551A1 (2350-00-140-5151).
9-2350-232-12	Tank, Combat, Full-Tracked: 152-mm Gun/Launcher, M60A2.

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9-2350-258-12	Tank, Combat, Full-Tracked: 105-mm Gun, M48A5.

TECHNICAL BULLETINS (TB)

750-103	Maintenance and Care of Common-Type Machine Tools and Shop Equipment Before-, During-, and After-Operation.

GRAPHIC TRAINING AIDS (GTA)

3-7-8	Armor Bridge Classification Wheel.
5-10-28	Demolition Card.
21-31	M16/M16A1 Rifle Maintenance Card.
44-2-1	Visual Aircraft Recognition Study Cards.
44-1-A thru 44-1-0	Ground Observer Aircraft Recognition (GOAR) Kit.

ALLIED COMMUNICATION PUBLICATION (ACP)

ACP 125(D)	Communication Instructions--Radio-Telephone Procedures.
APC 134(A)	Telephone Switchboard Operating Procedures.

VIDEO TAPES

ARC-25-72	Hand And Arm Signals.
ARS-45-74	Visual Signals.

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